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The Relation Between the Size of a Business
Enterprise and its Cost of Production

THE RELATION BETWEEN THE SIZE OF A BUSINESS
ENTERPRISE AND ITS COST OF PRODUCTION

BY

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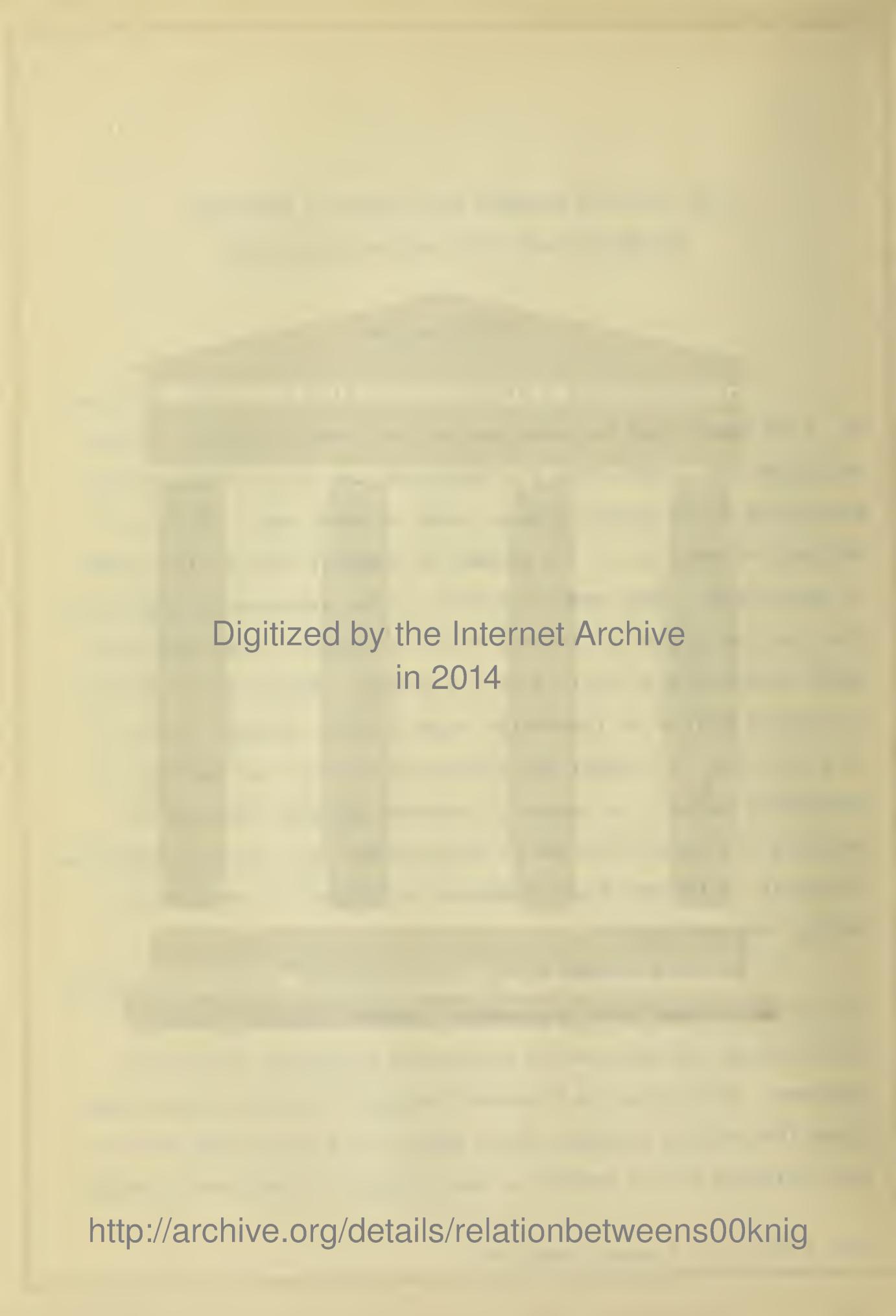
THE RELATION BETWEEN THE SIZE OF A BUSINESS ENTERPRISE AND ITS COST OF PRODUCTION

I. Introduction

In undertaking a study of this kind the first thing to do is to make clear the meanings of the terms employed. Much confusion has arisen from the ambiguous use of the term, cost of production, in different senses, such as money cost, psychic or subjective cost, etc. The phrase is commonly used in the sense of money cost. Thus used it refers to the expenses of production, that is, the number of dollars worth of capital goods and labor spent in getting an article on the market. Professor J.A. Hobson, an eminent writer on industrial organization, defines the cost of production to include the following: cost of raw materials, productive wages, i.e. wages of persons directly employed in handling the materials used in manufacture, and standing expenses, virtually inclusive of all expenses incidental to manufacture, buying, and selling.¹

In the business world, and especially among accountants, the phrase is used with a somewhat narrower meaning, namely, as including the expenses of production exclusive of selling expenses. Since this is a rather technical use of the term and since the selling expenses are a part of the total cost of putting anything on the market as much as any of the other expenses

¹The Industrial System, page 192.

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of production, I have adopted the meaning of the term which Professor Hobson attached to it as being less likely to lead to confusion of thought. That is, I use cost of production to include all the expenses of production of which selling cost is one.

By business enterprise is meant an individual establishment or production unit in any line of industry - extractive, manufacturing, trading, etc. In discussing the problem of large and small scale production, writers are prone to confuse two separate and distinct problems: the problem of large scale management and the problem of large scale production. Both are important problems of industrial organization, but to avoid confusion of thought it is prudent to keep them separate. The first is largely a problem of industrial technic; the second is more a matter of management and finance. In this study we shall consider the costs of a simple operating plant or establishment as a unit - the problem of the most economic scale of production rather than the problem of the effective scale of management.

A survey of the industrial world will show a great difference in the size of establishments, not only as between different industries, but between establishments in the same line. Even in those departments of industry where capitalistic production predominates, great numbers of small businesses survive. In nearly every line of industry we find at one extreme the very small enterprise and at the other the very large. According to conditions within and without an industry, there is a certain size of establishment which will give the maximum efficiency of production. If this size is known, then under a regime of perfect

competition, all establishments in that line will tend to approximate this most economic size.

The determination of this ideal size of enterprise from an operating standpoint is becoming more and more important. The early history of our industrial development is a history of the exploitation of our natural resources. For their success, concerns depended more on their control of some of these resources than on improvements in the methods of production and the lowering of the production costs. In the last few decades there has been a great change. The great increase in population has begun to overtake the decreasing resources. It is clear that we are entering the stage of diminishing returns in our agriculture and industries dependent on agriculture for raw material. Besides the difficulty of securing the raw materials of industry, there is a strong movement in the way of the passage of protective labor laws, minimum wage laws, etc. These regulations tend to raise the cost of labor and consequently the costs of production. Under a regime of such keen competition as exists today and with concerns doing business on such a narrow margin of profit as most concerns are, the realisation of small economies which a few years ago would have been looked on as being too trifling to be noticed may mean the difference between success and failure. The recent efficiency and scientific management movements bear able witness to the awakened interest in the reduction of costs. If for each particular line of industry there is an ideal size of enterprise which is able to make and sell its products at a lower cost than the concerns of other sizes,

then a considerable advantage will accrue to those concerns which approximate this ideal size. Therefore, it is evident that there is a great need for investigations along the line of determining the most economic size of business enterprise.

It may occur to the reader that it would be wise to limit the study to one industry at most rather than to try to cover the whole industrial field. As will be shown later there is not enough information available to warrant the making of an intensive and detailed study of any one industry. One must be content to secure information from whatever sources it may be secured. It is for this reason that this study is an extensive study of industry in general rather than a special investigation of any one industry.

This study will be divided into two parts. The first part will deal with the theory which has grown up with the changes in industrial organization as to the relation between the size of a business enterprise and its cost of production. The second part will consist of more or less unrelated studies of such material bearing on the subject as I have been able to collect.

II. The Theory of the Relation Between the Size of a Business Enterprise and its Cost of Production

It will be my purpose in this section to trace very briefly the growth of the theory regarding the relative merits of large and small scale production. I shall attempt no exhaustive or extensive examination of the literature on the subject, but will only endeavor to follow the general development of the theory as it has changed with the changes in industry and industrial organization.

The size of a business enterprise is a function of the industrial, commercial, and political development of society. The small business enterprise of colonial times in the United States was the product of the simple political and industrial organization just as the large corporate organizations today are the product of the present day conditions and influences. Large scale production and small scale production are relative terms. What was considered as large production in 1800 would be thought of today as production on a very small scale. It is possible that what is today considered as an enterprise of immense proportions may come to be looked on in the future as merely a step in the evolution to an enormous enterprise supplying a world-wide market. The factors which in the past limited the growth of business units have been eliminated to a large extent and strong forces favorable to large production have come into play. Whether or not the present expansion and growth of business enterprises will continue indefinitely depends on the interaction of many forces, favorable and unfavorable to large produc-

tion units. A study for the purpose of determining the most economic size of establishment in a given industry amounts to a consideration of the factors, positive and negative, which condition the growth of the establishment.

Not until comparatively recent times has the problem been of sufficient practical importance to call forth more than sporadic references from the writers on economic subjects. The early Greek references to the scale of operations an industry should be carried on are interesting. For example, Xenophon advised that the salt mines be operated on a large scale: the salt would, he asserted, be produced at a lower cost. Plato, in his Republic, speaks of the division of labor. "All things," wrote Plato, "will be produced in superior quantity and quality and with greater ease, when each man works at a single occupation in accordance with his natural gifts and at the right moment, and without meddling with anything else."¹

It is likely that many such incidental references could be found, but not until comparatively recent times have the problems of industry been of such prominence as to warrant a special study. It was the Physiocrats, the founders of the science of political economy, who first recognized the definite problem involved and who made the first attempts, even tho quite theoretical, at its solution. In the time of the Physiocrats agriculture, of course, was the most important industry. Such manufacturing as was carried on was in small shops and almost entirely by hand labor. The

¹ Republic, Book I.

Physiocrats, especially in their consideration of agriculture as the only productive activity, were concerned with agricultural problems. Incidentally their attention was attracted to the determination of the most advantageous size of farms. Quesnay, a representative Physiocrat, wrote, "Let the lands devoted to the cultivation of grain be joined together as much as possible in large farms managed by rich cultivators; for there is relatively much less expense, and much greater net produce in large agricultural enterprises than in small."¹

Undoubtedly one of the greatest factors in the growth of our large industrial establishments has been the advantages accruing from the intensive application of the principle of the division of labor, which was first definitely and clearly stated by the great Scotch economist, Adam Smith. Prior to the time of Smith many writers had noticed the principle of the division of labor as one of the most important aids in augmenting and developing the national wealth, but it was left for him to trace the results arising from the application of the principle. The opening pages of the Wealth of Nations which Smith devotes to the discussion and illustration of the principle, have been reproduced time and time again by later writers. In fact, these classic pages on the division of labor are familiar to every reader of general economic literature. The principles assigned by Smith as the causes of the advantages arising from the division of labor are: "The great increase in the quantity of work, which in consequence of the division of labor the same number of people can perform is owing to three

¹Quoted by J.S. Nicholson, Principles of Political Economy, page 140.

circumstances: first to an increase in the dexterity of every particular workman; secondly, to the saving of time which is commonly lost in passing from one work to another; and lastly, to the invention of a great number of machines which facilitate and abridge labor, and enable one man to do the work of many."¹

Smith was pessimistic about the future development of corporate organizations. He states that for large enterprises more capital is needed than the partnership can supply.² Hence the corporation is primarily useful as a means of aggregating large resources. Thus, in speaking of corporations, Smith had in mind large scale production. According to him a joint company ought not to be established except for some purpose of remarkable utility, requiring larger capital than can be provided by private partnerships. In this category he would place nothing but banking companies, insurance companies, canals, and water works. The directors of the companies, being managers of other people's money rather than their own, do not watch over it with the same "anxious vigilance" as do the partners of a copartnership. Extravagance, neglect of small matters, speculation, and mismanagement are very likely to be found in the large company.

Smith lived in a period when economic conditions, which were primitive as compared with those of today, were beginning to change fundamentally. The industrial revolution was soon to lead to a reorganization of industrial methods. There was no such

¹ Wealth of Nations, Book I, Chapters 1, 2, and 3.

² Ibid., Book V, Chapter 1.

thing as the factory as we know it. Manufacturing processes were carried on either in the home or in the work shop of the artisan with simple tools and in a few cases by horse or water power. The lack of transportation and communication facilities limited the market to neighborhood scope. The economists of the time concerned themselves more with the "circulation of wealth" than with its production. The treatment accorded production was little more than a discussion of the advantages and disadvantages of the division of labor and its effect in augmenting the productiveness of labor.

For some years after the publication of the Wealth of Nations writers were satisfied to explain and expound the doctrines laid down by Smith without making any valuable contributions. It was not until 1821 that James Mill set a precedent to be followed by later writers when he dealt with Production as one of the four major departments of political economy. By thus treating Production as a separate and distinct subject specific attention was directed to its problems. Naturally this was conducive to a more intensive and exhaustive study of the subject. James Mill commented briefly on the influence of the division of labor on the scale of production. "For the dividing of labor, and distributing the powers of men and machinery to the greatest advantage, it is in most cases necessary to cooperate on a large scale; in other words to produce the commodities in great masses. It is this advantage which gives existence to great manufactures, a few of which, placed in the most convenient situations, sometimes supply not one country, but many countries, with as much as they desire

of the commodity."¹ As the logical outcome of the discussion of the application of the division of labor to agriculture, the question opened by the Physiocrats was again taken up - the advantages of large and small farms - a question which has been discussed as much as any other in the art of political economy. Economic treatises of the time devoted usually a chapter if not more to the merits of large and small farms. Most of the discussion amounted to a little more than theoretical statement of the advantages and disadvantages of small and large scale farming with the writer emphasizing the side of the question which he favored. This theoretical discussion would be followed by illustrations taken from a particular locality which would prove the writers contentions¹ and from the particular cases general conclusions would be drawn. Naturally, a considerable diversity of views was presented. A typical treatment is given by Charles Gamilh in his Political Economy, published in 1812. After a discussion of the advantages and disadvantages of large scale farming, he says, "The point is not yet decided whether the division of agricultural laborers is more profitable than its concentration; or in other words whether small or large farms are advantageous to the public wealth. Both have numerous and illustrious defenders."²

In the early part of the nineteenth century the rapid changes in the organization of industry as it developed into the

¹Elements of Political Economy, Chapter I, page 8.

²An Inquiry into the Various Systems of Political Economy, page 137.

factory system with capitalistic production, began to attract attention. Allusions were made to the tendency toward the growth of large establishments or large capitals as it was called. In 1828 T. R. Edmonds pointed out that "large capitals effect much more and occasion greater improvements in the application of labor than if divided into many small capitals. A large capital undersells a small capital from being, at first, more than proportionally powerful, and afterwards from increasing more rapidly in power by means of new inventions. All capitals engaged in the same trade over a large district have a natural tendency to unite themselves together in one place."¹

That the division of labor when associated with sufficient auxiliary capital tends to the concentration of production in large establishments was first definitely set forth by Babbage in 1832. In his book, 'Economy of Machinery and Manufactures', he devotes an entire chapter to this subject, On the Growth and Consequences of Large Factories. As one of the main causes in the growth of the size of factories, he lays down this important principle: "When all the processes into which it is most advantageous to divide it, and the number of individuals employed in it are ascertained, then all the factories which do not employ a direct multiple of this latter number will produce the article at a greater cost."² His meaning may be illustrated from the

¹Practical Moral and Political Economy, page 80.

²Economy of Manufactures, page 212.

shoe industry today. There are over four hundred processes involved in making a pair of shoes. Suppose that two thousand men are required to operate these processes most economically. Then a concern to operate at the lowest cost must employ some multiple of this number.

"Other circumstances, however, contribute to the same end and arise from the same cause - the division of labor,"¹ he says. There is an advantage in having all the processes in one building, especially where heavy materials enter into the manufacturing. This arrangement will facilitate a steady flow of the product from the raw material to the finished article. The factory should be large enough so that each type of work will be sufficient to occupy the time of at least one man. For example, a machine needs some little attention to keep it in proper running order. There should be enough machines that one man may be kept busy doing this one thing. In those factories where power may be used, the manager will try to keep enough machines to make continual and full use of the engines. Babbage believed that the increased use of machinery would lead the manufacturers to run night and day to get the maximum return from the equipment. With this in mind he pointed out that as the factory grew the expenses of lighting would increase to such proportions that an individual lighting system would be installed instead of depending on outside sources. When a certain size is reached it will become

¹ Economy of Manufactures, Chapter XXII.

profitable to use the by-products of manufacture. The large factory will have an advantage in its reputation. Buyers will prefer to deal with it because they will not have to go to the trouble of verifying the quality of the product. The large factory has resources which enable it to do many things which a smaller concern can not do. "Owing to the command of capital and the scale on which operations of large factories are carried on, the returns admit of the expense of sending out agents to examine into the wants and tastes of distant countries, as well as trying experiments, which although profitable to them, would be ruinous to establishments possessing more limited resources."¹

The work of Babbage stands out as an important contribution to the theory on the subject of large scale production. The writers following him took up the study of this phase of production, and from this time on more and more was large scale production in manufacturing considered to the neglect of the same question in agriculture. An interesting work put out in 1839 by J. S. Eisdell, called a Treatise on the Industry of Nations, shows the importance attributed to agriculture even at that time. He devoted nearly five times as much space to agriculture as he did to manufacturing. After reviewing the points made by Babbage in regard to the growth of factories, he criticises a law of the day which forbade more than five partners to be associated in an enterprise as being a restriction on the productive power of a

¹ Economy of Manufacture, page 222.

nation. He reasoned that the large enterprise was more effective than the small one. The large enterprise requires more capital than can ordinarily be contributed by five partners. Therefore, the law should provide for the association of a large number of men in one enterprise. In conclusion he says, "A considerable division of employment is more easily effected in large than in small manufactories, and in consequence commodities are produced at a cheaper rate in a large than in a small way."¹

The classical economists and socialists agree in the importance they attach to the movement toward the concentration of production in large establishments. While the economists were pointing to the movement as a force adding to the productive power of the nation, the socialists were just as vigorous in commending the movement as a sure means of eventually attaining their end - government ownership of the instruments of production. A French writer, C. Pequeur, who in his views stood in an intermediate position between the socialists of the time and the classical economists, was probably responsible for suggesting the theory of production which has become so dear to the hearts of the later socialists. In his book published in 1839,² he clearly pointed out that the older methods of production would surely give way to the new factory method with its economies of production on a large scale. He says, "Everyone knows that, in reality, in using steam to reduce the cost of products and realize great

¹ Industry of Nations, page 218

² Economie Sociale, 2d edition, 1839, pages 56, 57.

advantages, it is necessary to operate on a large scale, to use large amounts of capital and a large number of workmen; in a word, to produce on a large scale---otherwise there is no economy. The expense of the initial establishment and maintenance of two steam engines of unequal power is not proportional to their degree of equality. Thus an engine twice as powerful as another does not cost twice as much; it does not require two stokers instead of one; twice as much room, twice as much fuel, nor twice as much time to operate." His socialistic leaning is shown by the question he asks, "If production on a large scale has undoubted advantages, what is likely to happen to the small establishments?" His answer would be that they would be wiped out by cruel competition and in time the owners would become proletarians.

Some years later, in 1867, Marx published his well-known "Capital" in which he formulated the socialistic theory of the concentration of production. Marx saw no difficulty in socializing industry. The natural working out of the law of concentration would gather all instruments of production including those of agriculture into a few hands. Large scale production will reign supreme, for cooperation on a large scale, the use of machinery, and the singleness of purpose of collective activity will only be possible when concentration has taken place to the fullest extent. The large enterprise beats and swallows the smaller. "A decreasing number usurp and monopolize the benefits of industrial progress, whilst the mass of misery, of oppression, of servitude, of deprivation, and of the exploitation increases. But at the same time the working class continues to grow in

in numbers and is disciplined, united and organized by the very mechanism of capitalistic mode of production. The concentration of the means of production and the socialization of the mode of production reach a point where they are incompatible with the capitalist integment. The knell of the capitalist private property will have been rung. Those who expropriate will be expropriated.¹ Thus the noted socialist, E. Bernstein describes the evolutionary process. When capital has been collected into a few hands and industry is carried on in great enterprises the structure will become unstable of its own weight; it will be a simple matter for the government to take over the instruments of production. Thus does the law of concentration work out in theory. When we come to take up the views of the present day socialists, attention will be called to a reactionary group of socialists who are losing this faith in the potency of this law to accomplish their ends.

Prior to John S. Mill writers had treated large scale production as one of the characteristic effects arising from the further extension of the principles of the division of labor. While it is true that the division of labor is one of the most, if not the most, important factor causing the growth of large scale production units, there are other considerations which should be taken account of, and which were largely neglected by writers in their zeal to expound the advantages of the famous principle of Adam Smith. Mill saw a wider field of forces affecting the scale of production and he devoted a special chapter of his notable work on the Principles of Political Economy to an

¹Encyclopedia Britannica, Volume XVII, page 811.

analysis of the forces tending toward the enlargement of production units. He took up topically the following: the advantages of a large system of manufactures; the advantages and disadvantages of the joint stock principle; the conditions necessary for a large system of production; large and small farming compared.¹ Mill's treatment of the subject clearly shows a more careful analysis than had ever been made by earlier writers. He attributes the growth in the size of production units to the extension of the division of labor, to the introduction of processes requiring expensive machinery, and to the savings in the expense of management and supervision. He recognizes that the large enterprises must have more capital than individuals can supply, and comments on the growth of the joint stock principle as a condition favorable to the gathering together of great quantities of capital. He points out, as did Adam Smith, that there is negative force inherent in corporations due to the lack of energy, zeal, and interest on the part of the management. In the small enterprise the efforts of the managers are usually rewarded more directly than in a great corporate organization where responsibility is divided among many hands. Of the conditions necessary for large production, Mill said, "In the countries where there are the largest markets, the widest diffusion of commercial confidence and enterprise, the greatest annual increase of capital, and the greatest number of large capitals owned by individuals, there is a tendency to substitute more and more large establishments for

¹Principles of Political Economy, Volume I, Book I, Chapter 9.

small ones."¹ Mill was optimistic about the effects of further increases in the size of production units. When a business has been established on a large scale, "further enlargement of production is largely an unqualified benefit."

Since the time of Mill there has been a change in the organization of industry which is as striking as the change of the century before from the household industry to the factory industry. The power machinery has come into general use, the corporation has been adapted to aggregating large amounts of capital, new and improved means of communication have been adopted, such as the telephone, the telegraph, electric and steam railroads. The limitations on earlier industry arising from the narrow market have been removed. It is instructive to note the increase in railroad mileage in the United States during this period of rapid concentration. By ten year periods from 1850 to 1910 railroad mileage has been as follows:

1850.....	9021	miles
1860.....	39626	"
1870.....	52922	"
1880.....	93267	"
1890.....	167191	"
1900.....	198946	"
1910.....	249920	"

Everyone is familiar with the movement towards concentration of production which actually did take place and which is still taking place in industry and commerce. With the removal of the limitations on the development of large enterprises the favorable forces have become effective. Writers were soon attracted

¹Principles of Political Economy, Volume I, Book I, Chapter 9.

by the striking changes which were taking place, and for a quarter of a century we have had large scale production dinned into our ears. Economists have written chapter after chapter of involved discussion on the advantages and economies which, theoretically at least, should result from production on a large scale. Business men who were enlarging their plants dwelt at great length on the economies which they would be able to realize. Sometimes such economies were realized, but as often they touted the expected economies as a blind to conceal the real motive which was a desire for monopoly power thru the control of the market, etc. With the turning of attention to industry and commerce, the century long discussion of the proper scale of operation for farms was neglected. J. S. Nicholson in his well known Principles of Political Economy has a chapter¹ devoted to large scale production in which he considers the movement towards concentration in manufactures and in commerce. He follows this with another chapter called "Large and Small Farming." This illustrates the striking change in the method of treating the subject since the early writers. The theory of the tendency toward concentration of production has been supplemented by a theoretical analysis which attempts to specifically point out those factors in the expenses of production which increase by a smaller ratio than does the unit output when the size of the production output is increased. New terms, such as specialization and standardization, have been introduced to describe different phases of the division of labor.

¹Principles of Political Economy, Chapter VIII.

With the federation of production units under one central management a new movement was begun in industrial organization. It is called large scale management or administration as contrasted with large scale production. This tendency to centralized management brought up many problems of monopoly and restraint of trade which do not concern us here. In one way, however, this change has given rise to a new force tending to the enlargement of establishments. When several plants are put under one control the smaller and inefficient plants are closed. Production is concentrated in those plants which, by virtue of their location, operating efficiency, or other circumstances, are able to operate at a low unit cost. The enormous capital resources of the combination solves the difficulty which stands in the way of the small producer who would enlarge his plant - the lack of capital.

In industrial organization of late years two seemingly opposing tendencies have been manifested. One is toward the concentration of industry; the other is toward the integration of industry. It has been pointed out that if efficiency and economy lie in the way of the concentration or specialization, then surely integration is a movement in the wrong direction. The anomaly is one only in appearance. In reality the large integrated concern still preserves and practices the principle of specialization. In each step or process of production, production is on a large scale - not so large perhaps as another concern which limits its production to only one process of the series, but large enough to get the advantages of large scale production. Instead of being

a number of similar firms bound together under central management, it is a number of different processes bound together by a central management plus an inter-relation of industrial processes.

Before taking up the consideration of the theory which has developed along side of this growth of the size of production units, it may be well to point out an error which several writers fall into when giving the advantages of large scale production. They confuse large scale production with monopoly power. Advantages are included which arise from a more or less exclusive control of a given branch of production. While it may be true that monopoly is the goal toward which business is striving, it is important to keep distinct the two questions of efficiency of operation and of monopoly power. They are two different and distinct questions.

All writers agree that the very small enterprise produces at a disadvantage as compared to the larger. But, is there no end to the economies possible from further enlargement of the production units? Do economies increase cumulatively and indefinitely with the growth in the size of business enterprises? As was pointed out, the socialists say that there is no limit to the advantages accruing to the growth of an enterprise. Writers other than socialists disagree on this much debated subject. One group of writers believe with the socialists that if there is a limit to the profitability of large scale production it has not yet shown itself, nor are there any indications that we are soon to approach this limit. Over and against these thinkers, however, there is a large group of economists, which, by the way, includes

many of our best known writers, who believe that many of our industries are already suffering because they have over-stepped the natural limits of growth as fixed by the politico-economic conditions of our time. Thus, although there may be some disagreement as to the location of the most economic size of production unit in each industry, the great majority of writers, other than socialists, stand together in a firm belief that there is a limit to the profitableness of large scale production. They believe that there are economies to be realized thru large scale production up to a certain point; further enlargement beyond this point is accompanied by a disproportionate increase in some of the elements of expense which go together to make up the total cost of the product. Stated simply, when the small enterprise grows, there are some items of expenditure which do not increase in the same ratio as does the output. As the process of enlargement continues, even tho some of the factors of cost are still increasing at a disproportionate ratio, other factors of expense begin to increase in a greater ratio than does the output. If the growth in size continues, the disadvantages will in time offset the advantages and it is possible that the unit cost of the product will be higher than the unit cost in a somewhat smaller concern.

It is pointed out that the law of diminishing returns and its converse, the law of increasing returns, are applicable to all industries and not to agriculture alone. Whereas the law of diminishing returns is operative in agriculture, the law of increasing returns applies especially to other industries,

such as manufacturing. This adaptation of the laws of increasing and diminishing returns has led to a great deal of confusion in the thinking on the subject. When discussing the application of the laws to lines other than agriculture, writers, unconsciously no doubt, had different principles in mind than when discussing laws relating to agriculture.

In 1893 John R. Commons in his *Distribution of Wealth* called attention to the existing confusion of thought. He gives four standpoints from which we may look at the principles of increasing and decreasing returns:

- "1. The capital and labor of an entire industry thruout a long period of industrial development.
2. The capital and labor of an entire industry at a given stage in the development of skill and knowledge.
3. The capital and labor of a single enterprise at a given stage in the industrial progress, without reference to the area of the ground occupied.
4. The capital and labor invested in a given area of ground."¹

When discussing diminishing returns in agriculture, we take the fourth point of view as noted in the above quotation. In considering other lines of production there is a change in viewpoint to one of the other three, usually to number three.

Economists, or at least those economists who are trained thinkers, usually make a distinction in the use of the terms and define the meaning they attach to the laws. As a student turns from one writer to another, the difference in usage is very

¹*Distribution of Wealth*, Chapter III, page 117.

likely to leave him in the end with a composite idea of all the uses and no clear idea of any one of them. Bullock, in his *Introduction to the Study of Economics*, states the principle: "If capital is constantly invested on a single acre of land, a point is reached where it will be more profitable to invest more capital elsewhere."¹ In his discussion of increasing returns in manufacture he is consistent. He considers the law operative when the growth in size of the production unit is on a definite area of ground, i.e. growth by adding more stories to the factory building or by making better use of the ground space.

Marshall points out that the part which nature plays in production conforms to the law of diminishing returns and the part which man plays conforms to the law of increasing returns. He would state the law of increasing returns in this manner: "An increase in capital and labor generally leads to improved organization, which increases the efficiency of capital and labor." The two laws act in opposition to each other. "The proportion of the cost of raw material to the costs of the other elements will determine the preponderance of the two tendencies. Where the raw material cost is relatively small, there will be little opposition to the principle of increasing returns which acts almost unopposed"²

Professor Fetter in his *Economic Principles*, published in 1916, denies that the law of diminishing returns can correctly be applied to economy of production on a large scale. There are two ideas which should be kept separate. "The manufacturing enter-

¹ *Introduction to the Study of Economics*, page 168.

² *Economics of Industry*, page 180.

prise is assumed to enlarge the area of the land as needed, whereas the farm is taken as a fixed area."¹ On the other hand, Gide in the third edition of his "Principles of Political Economy" says, "The law of diminishing returns does not apply only to agricultural and extractive industries. It is a general law of production and may be put as follows: beyond a certain point, every increase in return requires more than a proportional expenditure of energy."² I have given a great deal of space to a consideration of the opposing opinions of several writers, even at the risk of becoming tedious, for the purpose of showing the diversity of opinion and the discrimination which the reader must exercise in studying this problem of production.

The economies and advantages of large scale production might be grouped under two general heads, namely, technical and commercial. The technical advantages are those arising in connection with the industrial processes, such as the advantages arising from further division of labor, the use of special machinery, etc. Commercial advantages are those which a company realizes by virtue of its power and magnitude of its operations. The advantages of buying and selling in large quantities are illustrations of the advantages of this class. It should be noted, however, that the legitimate advantages of this class may merge into illegitimate advantages arising from improper restraint of trade and other illegal practises.

¹ Economic Principles, Volume I.

² Principles of Political Economy, page 81.

The economies of large scale production have been frequently given and it is probable that they are familiar to not only students of economics but to well informed persons generally. It will be instructive to give a summary of the economies or advantages of large scale production as presented by economists of the first rank. The following analyses are given by the several writers noted:

Professor Bullock: 1. Economy in fixed capital.
2. Economy in circulating capital.
3. Ability to experiment.
4. Economy of skill.
5. Economy in carrying on subsidiary processes.¹

Professor A.S. Johnson:
1. More thoroly systematized division of labor.
2. Better mechanical equipment.
3. Cheaper power.
4. Utilisation of waste.
5. Lower price for raw materials and a higher price for the finished product.
6. Relatively lower charges for transportation.
7. Lower interest rates.

Professor Seager: 1. Further division of labor.
2. Equipment of capital better employed.
3. Advantages in buying the raw material and selling the finished goods.
4. Savings thru by-products.
5. More can be spent on experiments.³

Professor Taussig: Of the causes of the growth of large scale production Taussig says: Underlying then all is the increasing division of labor and increasing use of machinery."

1. Better opportunity to use machinery to an advantage.
2. Cheaper unit cost of power

¹ Introduction to the Study of Economics, Chapter VI, page 170.

² Introduction to Economics, Chapter 8.

³ Introduction to Economics, Chapter 10.

3. Subsidiary operations can be carried on to an advantage by the use of machinery.
4. Saving in overhead expenses.
5. Buying and selling economies.
6. Utilisation of by-products.
7. Possibilities of experimentation with new devices and methods.¹

Professor F. A. Fetter says: "The economy of large production is a particular case of the advantages of the division of labor". After a discussion of the advantages accruing from the division of labor in our large plants, he follows with a section devoted to the "Economical use of machinery in large production" and another section on "Economy of buying and selling in large quantities."² In "The Concentration of Industry in the United States" Willoughby gives a comprehensive list of the economies and advantages of large production. "Economy in operation is the great motive. The conduct of business on a large scale permits the use of improved and expensive machinery, the greater division of labor according to aptitudes, the employment of more skilled overseers and foremen, and the reduction of the general expenses of superintendence and accounting. A large concern can purchase supplies on a more favorable basis. It can consequently make use of waste and by-products that are destroyed by the smaller establishments. The large plant can, in general, keep its capital and plant more constantly employed. By manufacturing a variety of products it can accomodate itself to changing demands. It, moreover, is not dependent to a like extent on uncertain orders as is the smaller concern, but can in a way make its own markets, or at

¹Principles of Economics, Volume I, Book I, Chapter 4.

²Economic Principles, Volume I.

least determine more accurately in advance the probable demand for its product. Having a much larger market, a falling off in one quarter is easily counterbalanced by an increase in others. A small concern must purchase many supplies which the large one can manufacture with profit for itself, and with the additional advantage that it is always certain of having them of a character and at a time desired."¹

As one goes over the views of these writers one is struck by the fact that the points mentioned by each economist show no fundamental variations and that this similarity arises out of the fact that there has been but little advance in the understanding of this subject since it was so ably presented by Babbage almost a century ago. These theories are of but little practical use since they are merely broad generalizations based on surface analysis rather than on a careful study of conditions as they are.

From a consideration of the forces which tend to the concentration of production in large establishments we now turn to the fundamental problem: what is the most economic size of an enterprise in any given line and what are the forces which tend to establish it at that point? Can a plant be enlarged indefinitely without counteracting forces arising to offset the economies realized? Are the largest concerns today still this side of the most economic size or have they passed it in their eagerness to be large and to secure the hoped for monopoly power? These are questions of great significance, not only to producers

¹ Yale Review Review, 1898, page 17.

but to the nation as a whole. That goods be produced with a minimum expenditure of energy is the common concern of every man.

The earlier economists were not troubled with such questions. The limitations to the growth of enterprises were absolute, such as limited market, lack of suitable machinery, lack of sufficient capital, and other restrictions of physical nature. Today the limitations have become more subtle: limitations which are not so absolute, and which may be exceeded at the price of higher cost per unit of output. Where large size carries with it some element of control over the conditions of production it is very likely that the increased unit cost will be incurred for the sake of this increased power which will enable a concern to make large profits by selling at a comparatively high price.

When we examine what the writers on large scale production have said on this phase of the subject, we find a great variety of opinions varying from those of the socialists who see no limit to the movement toward the concentration of industry to those who believe that many of our larger concerns have already passed into a stage of rising costs.

As would be expected, the majority of the present day socialists follow the Marxian doctrine and look upon the movement toward centralization and concentration with satisfaction. With indulgent air they point out that all the cry about the trusts is futile. This concentration of industry is a natural step in the evolution of industry and is sure to lead eventually to the socialization of all industry. Their theory might be

called the naive or evolutionary theory of the concentration of production. Let us see what some of our socialist friends say on this subject. "We socialists," says J. Morgan, socialist, "clearly see that as the little work shop and the small factory and mill had to give place to the larger manufacturing institutions, so the little business is absorbed by the ever-increasing corporation, and they, in turn, into trusts, till it requires no prophetic eye to see the form of the one all absorbing and controlling trust."¹

P. Rappaport, in an article called The Sweep of Events in the Light of History, says, "Progress in culture and civilization demand the most effective mode of production; centralization and concentration result in the most effective mode of production; centralized production in the hands of organized individuals is dangerous to society; consequently, what?"² His answer, of course, would be government ownership and operation.

The socialist congressional hand book for 1914, after giving the table taken from the Report of the Thirteenth Census of the United States showing the growth in the size of establishments, states, "These figures are far more significant than appears at first blush. They show in another way the enormous centralizing of the processes of production - the absorbing by the greater enterprises of all the country's industry, the inevitable stamping out of the small concerns....As a matter of fact, no conceivable power can stop these developments, and they

¹ Chicago Conference on Trusts, page 319.

² Sweep of Events in the Light of History, Arena 38:120.

have nothing to do with the greed of man. They are simply business in the present state of evolution. Greater economies, greater efficiency, greater profits lay in combination, concentration, organization and simplification of processes..... Human power could not check such development any more than it could check the tides."

The socialists are very prone to fall into the error of confusing the idea of large production units with that of combinations and trusts. In one breath they speak of the enormous growth in the size of establishments and the advantages accruing therefrom and in the next breath they point out the evils this large production has brought in the way of monopoly power and unethical methods of the trusts. Likewise, seldom is any discrimination made between the economies of large scale production and the economies of large scale management. It is a part of the socialistic doctrine that with the growth of large establishments the small ones will be eliminated. A favorite method of demonstrating the existence of a socialistic law of concentration is to show that the small enterprises are disappearing. By attacking the problem in this negative way they are not troubled with the question of the possible growth in the size of establishments. They consider their point established when they show that a lessening number of small establishments exist each year.

In the socialistic ranks within the last few years there has been an interesting reaction from the optimistic prophecies of the followers of Marx as to the natural evolution of industry to a socialistic state. The actual working out of the evolutionary ¹Socialist Congressional Handbook, page 114.

principle seems to have been somewhat of a disappointment. In agriculture, the small farm still persists; the steam plow has not "revolutionized agriculture by destroying production on a small scale." In nearly all lines of industry, the small enterprises are apparently flourishing with irritating persistency.

Simkhovitch devotes a chapter of his book, *Marxism Versus Socialism*, to an attempt to prove by the use of statistics that the concentration of industry has not proceeded as the socialists would have it. He says, "Even in the United States where industrial concentration has proceeded much further than elsewhere, it falls far short of the expectation of Marx..... There has been no such centralization as the Marxian vision of the future economic development presaged."¹ In his conclusion he asks: "If certain conditions and tendencies make socialism inevitable, do not the absence of these conditions and presence of contrary tendencies make socialism impossible?"² The revisionists answer that they realize that Marx was wrong about the law of concentration. They would substitute municipal socialization of industry to meet the conditions as they have actually worked out. Under this plan all enterprises would be operated by the municipalities in much the same way as our public utilities are operated today. Of course they would make exceptions of such enterprises as railroads which by their very nature are national rather than local.

To further illustrate this change of mind let us

¹ Introduction, viii.

² Page 61.

consider the views of one more socialistic writer who doubts the efficacy of the argument based on the so-called law of concentration of industry and who favors its abandonment as a possible instrument of their own self-destruction. Bernstein, in his work called Evolutionary Socialism, clearly points out how the facts of experience have failed to measure up to the socialistic doctrines. "The workshop of the world is accordingly, far from being, as is thought, in the stage of containing only large industries. Enterprises show the greatest diversity in size..... And no class of any size disappears from the scale." In another place he says, "If the continual improvement of business methods and the centralization of business in an increasing number of the branches of industry are facts whose significance scarcely any reactionaries can hide from themselves, it is no less well established that small and medium sized undertakings appear quite capable of existing beside the large industries..... There can be no doubt that in the whole of Western Europe, as also in the Eastern States of the United States, a small and medium agricultural holding is increasing everywhere, and the large and the very large holding is decreasing."¹

It is to be understood that only a comparatively small part of the socialists has adopted this view. It is principally the "revisionists" who are the reactionaries. The majority are not yet ready to give up this doctrine which has been one of the pillars of their theory. I.M.Rubinow, in a pamphlet called

¹ Evolutionary Socialism, Chapter II. The Economic Development of Modern Society.

"Was Marx Wrong?" vigorously attacks the conclusions of Simkho-vitch. He takes issue with Simkhovitch on the statistical material which he presents. He claims that the figures ^{as} Simkhovitch took them from the census are misleading, and gives statistics himself to show that concentration is still continuing at a steady rate as well as in other lines. In conclusion he says of Simkhovitch: "His purpose in the body of the book appears to be to destroy the socialist movement by showing that it is built on sand."¹

It has been said that what one wishes to believe, that does he most easily believe. This is particularly true of political beliefs. It is likely that the great majority of Socialist writers approach this question with a preconceived notion of what they ought to find and their investigations are attempted justifications of their theories.

When we turn to other writers than socialists, writers who have no personal interest in showing a certain thing to be true, we find a great diversity of opinion varying from those who see with the socialists no limits to the growth in the size of production units to those who believe that already many of our larger enterprises have reached and passed the point of the most economic size. Of course, to fix the location of this most economic size in any industry theoretically would be almost impossible. At the best it would be little more than a general and arbitrary decision. What the writers do try to do is to point out the conditions which tend to limit the growth of an establishment beyond a certain point, and then to speculate as

¹Chapters II and III.

to the potency of these factors as compared with the factors which make for further growth. It is in the relative effectiveness attached to these limiting factors that writers disagree.

The most satisfactory method of giving the views of different writers is to give quotations from different ones which will show their views on the subject. Owing to the fact that the expressions of opinion are so general and indefinite, an attempt to summarize them would be unsatisfactory.

"There is an antidote to its excess in the fact that as a business enterprise may be too small, so may it be too large to be profitable; the difficulty and consequent cost of effective supervision become, when a certain stage of growth is reached, too great for the attendant profits, and usually, altho not, perhaps, always, the point will be reached before a seriously injurious monopoly will be created."¹

Bullock, page 175 of his *Principles*, gives what he considers the counterbalancing disadvantages that tend to keep the production unit within limits. "Maximum economy when still of moderate size; use of electricity puts the small producer on a par with the large when it comes to matters of power; new inventions are given publicity, small concerns can avail themselves of them; small producers may, by locating in a group, cooperate and secure the advantages of large scale production without the disadvantages; the small concern can be more efficiently superintended."

¹Charles J. Bonaparte, Chicago Conference on Trusts, 1899, page 620.

Professor Seager classifies industries into three groups
"1. Those in which the small producer has an advantage. 2. Businesses in which large scale production is more economical up to a certain point beyond which there is a loss in efficiency resulting from the absence of direct and personal supervision of the enterprise. 3. Those enterprises where the economies of large scale production persist until a complete monopoly is reached."¹

"Most of the advantages and economies of large scale production are reached and passed a good way this side of the least possible step of integration."²

"Every manufacturing industry, considered from the point of view of production, has at any particular time a size which may be regarded as its normal size of maximum efficiency. This size is determined by the extent to which the division of labor and use of machinery can be applied."³

"Statistics show that the representative individual enterprise is constantly increasing..... The small enterprises are gradually being eliminated, capital tends to group itself in larger and larger masses; the size of the production units is constantly tending to increase taking industry generally..... Admitting that there may be a point of maximum growth at which production and distribution are most profitable, efficient, and economical, modern invention and skill are constantly pushing back the point beyond which diminishing returns can no longer be

¹ Bullock, Principles of Economics, page 166.

² H.J. Davenport, Economics of Enterprise, page 483

³ H.C. Adams, Michigan Political Science Association, Vol. I, page 109.

be evaded. This tendency gathers strength as it grows, for as existing enterprises increase in size, so also does the difficulty of establishing new enterprises become greater."¹

"The limitations on large scale production arise mainly from the infirmities of human nature. The extension of the scale of operations means an ever increasing reliance on hired labor and an ever-lessening reliance on spontaneous self-interest..... If all men worked with as much energy and spirit for an employer as they do for themselves the spread of large scale production would be almost without bounds."²

"Modern conditions of capitalist industry have in many prominent trades led to so large and continuous increase in size of successful businesses as to have given rise to a loose popular notion that a general, if not a universal, tendency exists for successful businesses to grow bigger and bigger without assignable limit and for small businesses to disappear..... A general survey of facts does not support any sweeping generalisation about the economy of the concentration of capital....."³

"Even in enterprises best suited to concentration, it has not been shown that evolution in that direction goes on indefinitely. It is probable, on the contrary, that it will not go beyond certain bounds. The growth of social organisms, just like that of living organisms, seems to be restricted by nature within definite limits..... It is beginning to be realized today that

¹ Carter, The Tendency Toward Industrial Combination, page 152.

² Taussig, Principles of Economics, page 57.

³ J.A. Hobson, The Industrial System, page 183.

general costs are not much lower in very large than in small industry; not that the causes of economy we have just indicated do not exist, but that they are counterbalanced by other causes, which act in the opposite direction - costs of advertising and supervision, leakage, etc."¹

"The larger the output, the smaller, relatively, is the cost of production.....The large plant has an undoubted advantage over the small plant and this advantage increases almost indefinitely."²

"There are offsetting advantages which at length put an end to the economies of size. Labor cannot be indefinitely divided, and when the factory is large enough to keep running one each of the best machines known, there is little or no economy in duplication of machines. As the factory grows the factory manager can have less and less oversight; the eye of the master cannot be all over as in the smaller establishment. This defect soon proves disastrous unless mended by more elaborate methods of organization, reporting records, bookkeeping, etc., and the best of these prove expensive." The writer also points out the difficulty of transmitting steam power in the large establishment, the tendency for the large factory to create cities around them which gives rise to higher rents and a necessity of paying the workers a higher wage, the disadvantage of ^{not} being able to cater to a local

¹ Charles Gide, Political Economy, 1916, translation, page 162.

² Charles M. Schwab, North American Review, 162:655.

market as a principle trade field, the disadvantages in transporting raw materials which the small concern can often times secure in sufficient quantities in the locality.¹

A writer on the subject who is much more conservative than the average is Mr. Brandeis, now of the Supreme Court of the United States. I will present somewhat extended quotations from him:

"What the size of a business of greatest efficiency is cannot be determined in advance by a general rule. It will vary in different lines of business and with different concerns in the same line....What the most efficient is can only be learned from experience.....A business may be too large for efficiency as well as too small.....Efficiency does not grow indefinitely with increase in size.....Man's work often outruns the capacity of the individual man; and so no matter how good the organization the capacity of the individual man usually determines the success or failure of a particular enterprise.....Organization can do much to make firms more efficient. Organization can do much to make large units possible and profitable. But the efficacy of even organization has its bounds. There is a point where the centrifugal force necessarily exceeds the centripetal.....An organization can never supply the combined judgement, initiative, enterprise, and authority which must come from the chief executive officer. Nature sets a limit to his possible achievements."²

¹ F. A. Fetter, Economic Principles, Volume I, page 391, published in 1916.

² Business as a Profession - Trusts and Efficiency.

Theoretically at least, the real limitation to the growth of production units today seems to be one of human nature.

The external limitations have been removed only to be superseded by a limitation inherent in man himself: his inability to organize, direct, and supervise great enterprises effectively. It must be kept in mind that these limitations are operative only under conditions as we have them today. A strong movement is evident today in the direction of solving this human limitation. We have books by the dozens on the problems of management and efficiency methods. Business men are installing accounting systems which will be an aid in management. New methods of wage payment are used which are calculated to artificially stimulate the energy and earnestness in the worker which were formerly aroused by the worker's interest in what he was doing. Where the worker once produced for purposes of consumption, he now works for wages, scarcely knowing what he is making. The chief aim of the laborer is getting and keeping a job rather than the creation of utilities, the consumption of which he could anticipate, or at least could look on as bearing the impress of his personality, something which he cannot do when the work is separated into fractional parts which are distributed to the different operators. The larger the unit, the more is this true. As the unit enlarges there is coupled with the difficulty of managing a larger plant this additional factor: the labor is cumulatively harder to manage so as to get the maximum return. It would seem that the growth of large scale production in the future will depend largely on the development of better managerial methods and the supply

of managerial ability. Whether or not the limitations, now existing, to further growth in the sizes of enterprises will be solved and establishments will keep on growing their only limit being the extent of the market is largely a matter of speculation. As will be shown in the next part of the thesis, technical men agree that in many lines establishments have grown sufficiently large to realize all the advantages of a technical nature which arise from large scale production. Further growth will be chiefly for the sake of the commercial advantages arising from the greater size.

The small producer in the past has been at a disadvantage due to the fact that he was ^{not} able to get a knowledge of the best business methods, best markets, inventions, etc. The small business man was usually a business illiterate. But conditions are changing rapidly. We have the magazines of business, correspondence schools, commercial schools in our Universities, and many other agencies which are educating the small business man. The large concerns no longer have a monopoly on the business knowledge. It is my belief that the small concerns are steadily cutting away a part at least of the disadvantages which they are laboring under as compared with the larger concerns. The unfair practises used by the large firm to browbeat the small producer are being eliminated thru government regulation. The sum of the whole thing is that competition is coming to be more and more on a scientific basis. Business ability is becoming more common among all classes of managers. The manager of a small concern, by virtue of the spread of education and business training, is

now approaching the same level of business fitness as the manager of the large concern.

Very briefly I have reviewed the theory on the relation between the size of a business enterprise and its cost of production. Theory may become of practical use only when verified by facts taken from actual experience. If the theory of large scale production is to be of practical advantage, then it should correspond to and be supported by the actual business conditions. We should be able to point to a given industry and to illustrate the theory by showing the correlation between increased size of establishments and the variations in the unit costs of the product. Investigations should be made of enterprises in the different lines of industry to determine the most economic size of production unit. Once knowing what size of establishment would make for lowest unit cost, the producer would strive to grow or contract so as to approximate this size. Needless to say, such practicability of theory does not exist as yet. Unfortunately the theory as yet is all too much a matter of speculation. The next section will be devoted to this problem - the verification of theory.

III. The Relation Between the Size of a Business Enterprise and Its Cost of Production as Shown by the Experience of Industrial Concerns

1. Methods of investigating the relative efficiency of different sizes of concerns.

An attempt to determine the most economic size of establishment in an industry will necessarily be a study of relativity. Given establishments of varying sizes, the problem is to determine which size of establishment is able to make and sell at the lowest unit costs. This assumes of course that the costs used in making the comparison are figured on a proper basis. It is not uncommon to find a concern showing ostensibly comparatively very low unit total costs when as a matter of fact its actual costs are very high. The apparently low costs are due to the fact that some elements of cost such as depreciation, provision for contingencies, etc. are not included. Needless to say, such concerns are very likely to come to an untimely end.

There are various ways by which comparisons may be made between the unit costs in establishments of different sizes. In a given industry the unit costs of different establishments may be compared. Or, when there has been a considerable growth in the size of plants in an industry it is possible to trace the effect on the costs of the increase in the output resulting from the growth. A third method is to compare the costs in establishments in different industries.

Each of these methods is open to some objection. In comparing different establishments of one industry, it will be found that no two plants are operating under exactly similar conditions, and that in some measure each establishment presents an individual problem. Consequently when comparing two establishments, allowance must be made for differences in operating and marketing conditions. In comparing a plant in successive periods of growth, there are the problems of varying costs of raw materials, labor, etc., and of the changing methods of production. In very few instances has the prices of material and labor and the processes of production remained the same over any considerable length of time. The third method is open to the same objections as the first and to a greater degree, namely, it would be even more difficult to find establishments in different industries which are enough alike to be comparable.

A great many of our concerns have some element of monopoly power by virtue of which they are able to purchase or sell at an advantage as compared with their smaller competitors. Such concerns are obviously not comparable with concerns not possessing such adventitious competitive power. Especially in the case of the very large concerns the low costs are due many times to ability to set their own buying prices.

A greater difficulty in the way of making proper comparisons between different establishments is that of securing adequate and reliable information as to costs. Where costs are known, they are very jealously concealed from their competitors. Concerns are very unwilling to let the data get outside of the

office. The great majority of concerns know very little of the actual costs themselves.

E. N. Hurley, former chairman of the Federal Trade Commission, has stated that one of the great difficulties the commission has encountered in their attempts to help the business men solve their problems is the lack of cost data kept by the concerns.¹ A group of manufacturers would apply for help on some problem, and when the Commission attempted to investigate the conditions it would be found that usually less than ten percent of the concerns knew anything definite about the costs of their product. The following quotation from the report of the Federal Trade Commission for 1916 illustrates the attitude of the Commission on the subject: "The Commission's investigations showed that a large percentage of the merchants and manufacturers of the country, particularly the small ones, had very inadequate knowledge either of their costs of production or of their selling expenses.....Even some of the most important concerns of the country manufacturing or selling several classes of goods could not tell the amount of sales of each class they handle, and those who knew the costs of, or amount of profit on each, were comparatively few.....The Commission wished to emphasize the advantages which would accrue to the business world by a better knowledge of industrial conditions and business results, and, in general, these can best be shown by statistics of particular industries.....Manufacturers are working on a smaller margin of

¹Report of Federal Trade Commission 1916, pages 14-17.

profit and must absolutely know what their goods cost. It is a fact well understood among business men that the general demoralisation in a large number of industries has been caused by firms who cut prices not knowing what their goods actually cost to manufacture, and the cost of selling, which is equally important is almost wholly lost sight of.....The number of smaller manufacturers who have no adequate cost accounting systems and who price their goods arbitrarily is amazing.....Whole industries, in many instances are suffering from a general lack of intelligent knowledge of costs."

This rather long quotation is given because it shows so clearly the actual conditions existing in the business world today, and the difficulty involved in determining the relative efficiency of business enterprises. Stone and Webster, the well known specialists in industrial organization, in answer to a question as to the proper method of making such an investigation said in part: "We are sorry that we do not know of any way that we can be of help to you. It is very difficult in any case to get trustworthy figures on business problems because they are rather jealously guarded from competitors, and one would, we should think, need many figures and in some detail to be able to judge accurately the relative efficiency of the different sizes of units. It involves, of course, full figures on the cost of production and these costs would have to be made up in the same way to be comparable.....We have many times sought information regarding various manufacturing processes and know that is is very difficult to get information that is in the least

dependable."

It is clear that a proper development of uniform accounting methods is essential to obtaining information on costs of any real value. It is very encouraging to see the growing interest taken in the use of accounting methods by the more progressive concerns. As was pointed out, a knowledge of costs has a definite survival value for both large and small concerns.

The methods used by the Agricultural Station of the University of Illinois illustrate the means which have been taken to find the costs for farms in Illinois. The Station sends men to install accounting systems for farmers in different sections of the country. Thereafter, at set intervals, either a representative of the station visits the farmer and balances his books or the books are sent in to the Station. It is understood that the Station shall be free to use the information shown by the reports. Thus a knowledge of the costs for a number of farms has been secured.

The efforts of the Federal Trade Commission to secure the adoption of uniform methods of accounting by the industrial and commercial firms over the country is a step in the same direction. At the present time a staff of accountants is employed to install accounting systems and give advise on such matters to business men over the country. As this movement toward the adoption of uniform accounting methods proceeds the question which we are studying will assume more and more practical importance, and the theories can be tested in the light of the known facts established from the actual experiences.

The material to be presented in this part of the thesis has been drawn from many different sources, and since these special studies have practically no relation to each other, I have made no attempt to connect them into a unified whole. I shall first take up the census reports for the purpose of showing the striking increase in the size of business establishments during the last two decades.

2. The growth in the size of business enterprise as shown by the United States Census.

Writers who discuss the tendency toward concentration of production into larger and larger units find the United States census reports to be the chief source of authority for the statements which they set forth. In a general way the census reports do show existing tendencies; but the figures leave much to be desired in the way of accuracy. The figures are neither complete nor exact. They are not supposed to be. Any attempt to make refined deductions from them is likely to result in misleading conclusions.

It is not difficult to find two writers using the same reports and drawing from them conflicting conclusions. A writer who has a preconceived notion as to what he should find in the census reports is very likely to find material supporting, and, to his mind, proving his theory. For example, Mr. J.W. Bennet after studying the census figures concludes that concentration of production in large establishments is a step towards inefficiency.¹ He says, "The average establishment has increased in size. It is the age of consolidation and inefficiency.....There is an unmistakable retrograde movement. The most vital argument for consolidation is increased economy and efficiency. Is consolidation along the lines now being conducted rather the cause of increased extravagance and inefficiency? Is our theorizing about

¹Arena, 37:413.

greater economy in large establishments to be upset by the cold logic of facts?" Mr. Bennet believes that the reports show that under present methods the large enterprises are inefficient. The trouble as he sees it is not with the principle of organization, but with the kind of organization. He favors a cooperative commonwealth rather than "the irresponsible autocracy which we have blithely built up." In conclusion he says, "Whether the causes be few or many, impaired efficiency within the past five years is an indisputable fact. The age of consolidation has become the age of inefficiency. With our pitifully small production per worker, impaired efficiency is the most serious thing. If our complex organization has been too cumbersome for further efficient service, let us simplify it. If we have reached a barrier in our industrial progress, let us remove it. If we are failing because too many get something for nothing let us see that they cease to get these gratuities." Unearned salaries, multiplication of red tape in great business organization, the stifling of individual initiative and ambition, and the multiplication of non-productive workers he sees portrayed in the census reports. It should be noticed that the writer makes no distinction between the growth in the scale of management and the growth in the scale of production.

A prominent mechanical engineer, Mr. S. E. Koons, writing in the Scientific American on effects of large scale production, used census reports as the basis of his conclusions.¹ In his mind it is very clear that the large establishment is relatively more

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Scientific American, 107:44.

efficient. "It appears," he says, "that the efficiency of production in the large plant is much higher than in the small one, more product per man is turned out, and (what is of greater real importance) a greater value per man is added to the product as the result of the manufacturing processes.....In value added through manufacture, the large plants showed 23 percent more per man than the total average, and 32 percent more than the smaller plants. This establishes our second point, the increased economy of operation of the large plant." Thus we see that two different writers have drawn conflicting conclusions from practically the same material. In a later section I shall refer to another writer, Mr. Earle Buckingham, of the Winchester Repeating Arms Company, who uses the census material as a basis for conclusions presented in a paper read before the American Society of Mechanical Engineers.

The unprecedented change in prices in the past few decades makes a comparison of the census figures for wages, materials, and value of product very unreliable. It is possible, of course, to reduce them to standard by using index numbers; but even then the incompleteness of the reports and the high percentage of error destroys the value of any refined analysis. In my study of the census reports I shall only attempt to show the tendency existing toward the growth of larger and larger production units. It will be objected, perhaps, that because an establishment is large it does not follow that it is efficient. The owners may possess monopoly power which fosters unnatural growth and overcomes and outweighs any internal increased costs.

Frequently such objections arise from the confusion of large scale management with large scale production. The so-called trust usually has several plants. Taken as a whole, it may be less efficient than the smaller concern, but it is very likely that it will operate those plants which are the most efficient. If it finds that two plants of medium size can produce a given quantity at a lower total unit cost than one large plant, the management will probably choose to use the two medium sized plants. Few of our combinations are making such profits that they would neglect to take advantage of all opportunities to make substantial gains. As a matter of fact, experience has shown that the formation of a consolidation of several firms is often followed by the abandonment of the inefficient plants and the concentration of production in the most efficient.¹ It should be kept in mind that the census reports with a few exceptions where two or more plants were operated under common ownership, or for which one set of books was kept, uses the single plant or factory as the unit in the compilation of its statistics.

There has been an erroneous belief on the part of many that concentration of production into large units has taken place to such an extent that the small concerns have been practically eliminated. If this were true, and all concerns were operating on a large scale, then indeed, the small concern, no matter how efficient, would offer no competition for the simple reason that their competitive power would be negligible. In reality the

¹The combination of sugar refineries is an example of this.

small establishment persists with surprising tenacity. The following table from the census report for 1910¹ gives an idea of the relative importance of the sizes of establishments. The figures represent the proportion which the items bear to the total.

Value of Products	No. of Establishments	No. of Wage Earners	Value of Product	Value Added by Manufacturing
Less than \$5000				
1909	34.8	2.1	1.1	1.7
1904	32.9	1.9	1.2	1.8
\$5000-\$20,000				
1909	32.4	7.1	4.4	6.0
1904	33.7	7.7	5.1	6.7
\$20,000-\$100,000				
1909	21.3	16.5	12.3	14.8
1904	22.2	18.8	14.4	17.3
\$100,000-\$1,000,000				
1909	10.4	43.8	38.4	41.9
1904	10.3	46.0	41.3	44.2
\$1,000,000-over				
1909	1.1	30.5	43.8	35.7
1904	.9	25.6	38.0	29.9
	100.0	100.0	100.0	100.0

Comparatively a small part of the product is put out by the small concerns, but it is clear that they have not as yet disappeared from the competitive field. It is rather surprising that a little more than one percent of the establishments put out over one-third of the total product.

While it may be true that in a few industries a small number of firms have a virtual monopoly and their policies are governed more by the selling price than the cost of production,

¹Volume VIII, page 180.

the large part of our industry is still on a competitive basis. The establishment flourishes which can give the best quality at the lowest price. As was just shown there are plants of all sizes in competition today. If it can be shown that establishments in the industrial field are enlarging very rapidly the presumption is strongly in favor of the belief that the large establishments have an advantage in operating and selling. It must be kept in mind, however, that there are many conditions for which allowance must be made. For instance, there is a tendency for the owners of capital to reinvest their capital return in the existing enterprise. Suppose a concern has attained approximately the most efficient size under its particular circumstances, and as a result is paying a comparatively high rate of return on the capital investment. The capitalists will be very likely to be disposed to invest their capital return in enlarging the plant, even past the most economic size. A new plant would be built at considerable trouble and risk, and it would have to pass through a period of growth during which its costs would be comparatively high. Investors would feel that they would rather take a little less return on their investment than go to the trouble of starting a new plant. Thus there is a tendency for the most efficient plant to grow beyond the most economic size. The very efficiency of an establishment makes for inefficient growth.

The following analysis of United States data for the census years, 1899, 1904, 1909, and 1914 shows in a general way the course which industrial development is taking.

Analysis of United States Census Data. Number or value per

		Totals	Establish- ment	Wage earner
Number of Establishments	1914	275,791		
	1909	268,491		
	1904	216,180		
	1899	207,514		
Number of Wage earners	1914	7,036,337	25.5	
	1909	6,615,046	24.6	
	1904	5,468,383	25.2	
	1899	4,712,763	22.8	
Number of salaried employees	1914	*****	****	**
	1909	790,267	2.96	.12
	1904	519,556	2.3	.095
	1899	364,120	1.76	.077
Primary horse power	1914	22,547,574	81.3	3.20
	1909	18,680,776	69.4	2.82
	1904	13,487,707	62.4	2.46
	1899	10,097,893	48.7	2.03
Capital	1914	22,790,980,000	82,000	3230
	1909	18,428,270,000	69,000	2780
	1904	12,675,581,000	85,500	2310
	1899	8,975,346,000	43,200	1900
Salaries	1914	*****	****	***
	1909	938,575,000	3,500	142
	1904	574,439,000	2,670	105
	1899	380,771,000	1,840	81
Wages	1914	4,079,332,000	14,700	580
	1909	3,427,038,000	12,800	520
	1904	2,610,445,000	12,100	478
	1899	2,008,361,000	9,650	427
Cost of Materials	1914	14,368,089,000	52,090	2,040
	1909	12,141,791,000	45,300	1,830
	1904	8,500,208,000	39,300	1,560
	1899	6,575,851,000	31,700	1,390
Value of Products	1914	24,246,435,000	87,950	3,445
	1909	20,672,052,000	77,000	3,130
	1904	14,793,903,000	68,500	2,800
	1899	11,406,927,000	55,000	2,420
Value added by M'f'g	1914	9,878,346,000	35,800	1,403
	1909	8,530,261,000	31,700	1,300
	1904	6,293,695,000	20,200	1,240
	1899	4,831,076,000	23,300	1,030

*Figures not available.

The figures show that there has been a considerable increase in the value of the product and value added by manufacture per establishment and per wage earner. The number of wage earners per establishment shows a comparatively small increase. At the same time, capital and primary horse power shows a striking increase per establishment and per wage earner. The number of salaried employees and the amount of salaries show even a greater increase per establishment and per wage earner.

It is clear that production is becoming more and more a capitalistic affair. Capital is rapidly displacing labor. Processes that once demanded skilled workers are now carried on by machinery with unskilled workers, often a woman or girl, to tend the machines. To give a concrete illustration of the movement which is going on I shall quote a description of the development of the envelope industry in the United States as given by the report of the Bureau of Statistics of Labor in Massachusetts.¹ "In 1844 a patent was granted in England for an envelope machine and about five years later the machine was patented in the United States. Since that time the machinery has been so perfected that the making of envelopes has become almost wholly a mechanical operation, thereby reducing the cost of manufacture.....In manufacturing envelopes the forms or blanks are cut directly from the paper, generally a ream at a time, by a steel die driven by steam pressure. These blanks are fed automatically to the envelope machine where they are folded

¹ Report on Statistics on Labor, 1915, Part VI, page 56.

the margins gummed, the proper edges being pressed together, and the gum, known as the seal, on the loose or upper flap being dried. These operations are rapidly performed while the envelopes pass through the machine, and, when thus completed, the envelopes pass on an endless belt to the front of the machine and are deposited in packages of 25 envelopes each. The operator then bands each package with a narrow strip of paper, and packs it in a box ready for shipment. As nearly all the operations in the manufacture of envelopes are performed by automatic machines, the majority of employees are women and girls.....In order to keep pace with the growing demand, machinery has been devised and improved until now, in a highly organized factory the workers are chiefly engaged in tending the machinery."

This change in the methods of manufacture is important in connection with this study for the reason that machine production is a condition very favorable to large production units. In proportion as the human element becomes less important in industry do the difficulties of supervision and management become less.

That there has been a rapid growth in the size of production units is shown by the increased output per establishment. A comparison of the totals of the different items included in the census reports for the different classes of industries which have sprung up in the fifteen year period or which have only been included in the census since 1899 have been eliminated from the figures for 1914 in order to make the comparison on the proper basis. The number of establishments has increased 12.13

percent; wage earners, 29.50 percent; primary horse power, 98.87 percent; capital, 114.77 percent; value of product, 80.83 percent. Even after making allowances for the inaccuracies of the census reports and for other factors which enter into the problem of the growth of business enterprises besides efficiency of the units, it is quite evident that there is a striking movement toward the concentration of the manufacturing industry into larger establishments. This movement, as was pointed out, is co-existent with the change in industry to the more extensive use of machinery. The substitution of electric for steam power has solved the difficulty of the transmission of power over a large plant and has removed one of the unfavorable conditions for the growth of the establishment beyond a certain size. To what extent the growth of establishments in manufacturing is dependent on the increasing use of machinery in production can not be foretold; but there is undoubtedly a very close connection between the two.

Attention should also be called to the great increase in the number of salaried workers. One of the characteristics of a large establishment is the large managerial force required. Difficulties of supervision demand a considerable number of clerical and administrative employees. The following table taken from Volume VIII of the Tenth Census indicates this increase in the salaried employees.

Employees in Manufacturing Industry

Year or Period Percent of Total	Total	Salaried Employees	Wage Earners
1909	100	10.7	89.3
1904	100	8.7	91.3
1899	100	7.2	92.8
Percent of Increase			
1899-1909	45.9	117.0	40.4
1904-1909	23.7	52.1	21.0
1899-1904	17.9	42.7	16.0

Those who wish to organize industry on a cooperative basis point with considerable emphasis to these facts: the salaried employees, or unproductive workers, as they choose to call them, are increasing steadily, and none but the laboring class must support them. Also those who are pessimistically inclined as to the wisdom of the growth of our large production units make a great deal of this relative increase in the supervisory force in industry which, they claim, increases the overhead so much that any possible advantages of large size are outweighed.

In the Census Report for 1914 there are included 334 classes of industries. I have divided these industries into four groups:

1. Those industries where the number of establishments in the period of 1899 to 1914 has remained the same or decreased.
2. Those industries where there has been an absolute increase in the number of establishments in 1914 as compared with 1899, but the increase has not been nearly so great as the increase of the value of product, number of wage earners, amount of

capital, etc. That is, the size of the individual establishment shows a considerable increase.

3. Those industries where the growth in the number of establishments has been consistent with the growth in the output, that is, where the size of establishment has remained practically the same.

4. This class is a residuary class. It includes the decadent industries and those industries where a change in reporting to the Census Bureau has occurred which would make it impossible to include it in making the comparisons. By decadent industry is meant one in which the value of the output has decreased since 1899.

It may be suggested that a fifth class should be included, namely, those industries where there has been a greater increase in the number of establishments than in the output. An examination of the individual industries included in the report will show that there is no healthy industry where this has been true to an extent which would warrant its exclusion from a normal class. In appendix "A" will be found the industries grouped in these classes. A study of these groups will be suggestive. It will be seen that the industries do not fall into different groups by chance, but that the nature of an industry determines the rapidity and the extent in the growth in the size of the production units. For instance, those in the first group of industries are clearly machine industries - industries in which capital represented by machinery is doing more and more of the work.

Of the three hundred and thirty-four industries there are one hundred in which the number of plants or establishments has remained the same or decreased while at the same time the output increased to a marked degree. There are 147 industries in the second group where the increase in the number of establishments has been disproportionate to the increase in output. In the third group there are 57 industries and in the fourth group 31 industries. Stated in percentages, 29.9 percent of all the industries have had no increase in the number of establishments since 1899 or since they have been included in the report of the census. 43.9 percent of the firms are in the second class; 17.1 percent in the third; and 7.1 percent in the fourth. The significance of these facts is further brought out by a comparison of the different groups. The table below gives for 1914 for each of the four groups, the number of wage earners, primary horse power, the capital, and the value of products. The same facts are then given by percentages.

Group.	No. of est'b'ts.	No. of wage earners	Primary Horse Power	Capital	Value of products
1.	52,949	1,982,650	8,894,731	7,663,684	7,756,596
2.	152,343	3,725,972	10,536,675	10,953,676	12,677,272
3.	42,661	1,195,249	2,679,399	3,691,082	3,387,790
4.	37,838	142,466	137,414	482,538	434,777
Total	275,791	7,036,337	22,547,574	22,790,980	24,246,435
L.	29.9	19.2	28.03	39.44	31.99
2.	43.9	55.24	52.82	46.71	52.25
3.	17.1	14.46	16.98	11.88	13.97
4.	7.1	1.01	2.02	1.94	1.79
Total	100.0	100.00	100.00	100.00	100.00

The principal fact shown by this table is the extent of the movement toward the concentration of production in large establishments. Almost three-fourths of the industries show some tendency toward concentration. The substitution of capital for labor in the large scale industries is shown by the comparative small ratio of 19.2 of wage earners for the first group which produces approximately 32 percent of the value of product. As we descend to the lower groups, labor becomes a more and more important part of the product; less product is turned out per man.

The next table presents a comparison of the figures for the different classes of industries in 1899 with those of 1914. Since several new industries have been included since 1899 in the Census Reports, it is necessary to eliminate them from the totals for 1914 to make them comparable with the totals for 1899. Obviously if we compare the figures for fifty establishments in 1899 with seventy-five in 1914 the result would be misleading.

Group.	No. of est'b'ts	Wage earners	Primary horse power.	Capital	Value of product
1. 1914	41,660	1,864,938	8,607,664	7,114,678	6,906,388
1. 1899	51,996	1,460,509	3,925,718	3,051,241	3,863,695
2. 1914	149,425	3,498,660	9,672,621	9,992,217	11,466,872
2. 1899	130,357	2,733,148	5,521,342	5,016,305	6,438,133
3. 1914	20,396	653,336	1,626,820	1,895,556	2,020,677
3. 1899	8,829	392,707	514,719	680,958	864,773
4. 1914	24,681	86,236	174,995	275,300	243,260
4. 1899	16,332	126,399	137,414	200,474	241,326

The following table presents the percent of increase or decrease for each period for each group.

1.	-19.87	27.69	119.26	133.17	78.79
2.	14.62	35.70	75.18	99.19	78.10
3.	131.01	66.34	216.05	178.37	133.66
4.	51.11	31.77	27.34	37.32	-3.34

(-) decrease.

In the first group altho the number of establishments decreased 19.87 percent, the wage earners increased 27.69 percent, the primary horse power, 119.26 percent, capital, 133.17 percent, and value of product, 78.79 percent. A large increase is shown also in group two. The exceptional ratios of increase in group three are due to the fact that many comparatively new industries which have grown rapidly, such as the canning and preserving industry, are included.

The next table shows the average number of wage earners, the primary horse power, capital, and value of product per establishment and the primary horse power, capital, and value of product per wage earner for each group of industries for the years 1899 and 1914.

Group	Year	Wage earners per establishment	Primary horse power per establishment	Capital per establishment	Value of product per establishment	Primary horse power per wage earner	Capital per wage earner	Value of product per wage earner
1.	1914	44.76	206.61	170,770	165,770	4.61	3810	3700
	1899	28.09	75.50	58,680	74,280	2.68	2080	2640
2.	1914	23.41	64.73	66,870	76,740	2.76	2850	3260
	1899	20.96	42.35	38,480	49,380	2.02	1830	2350
	1914	32.03	79.76	92,930	99,070	2.49	2900	3080
3.	1899	44.47	57.16	77,120	97,940	1.31	1730	2000
	1914	3.49	7.09	11,150	9,450	2.02	3190	2700
4.	1899	7.73	8.41	12,270	14,770	1.08	1580	1900

Little significance should be attached to a comparison of the amounts for each group, as, for example, it does not follow that since group three shows more wage earners, capital, primary horse power, etc. than group two that the establishments in general are larger. There happens to be several small scale industries included in group two which make the figures relatively low. Also a comparison of the amounts of primary horse power, capital, and value of product per wage earner for the different groups is not indicative of the size of establishments in the different groups for as was pointed out above, in a general way there is a different combination

way there is a different combination of labor and capital in each of the groups. In the first group there has been both an increase in the amount of capital employed and the number of wage earners. In the next group there has been considerable increase in the use of capital, but the increase in the number of wage earners per establishment has been relatively slight. In the third and fourth groups we find an absolute decrease in the number of wage earners in 1914 as compared with 1899. The slight increase in the product results from the increased productiveness of the labor which is employed. As machinery is installed, fewer wage earners are needed to turn out the same amount of product.

The figures presented tell their own story. It is evident that there is a change going on in manufacturing industry in the way of the more extensive use of machinery and the elimination of the human element. Secondly, it is evident that manufacturing concerns are growing in size very rapidly, the growth depending on the nature of the industry. This growth is accompanied by a relative rapid increase in the number of salaried employees, who, it seems, are necessary for the supervisory and clerical work in the larger establishments. As to how far the movement toward the concentration will proceed, the census reports give no conclusive evidence.

In a recent book, Germany's Economic Progress and National Wealth, 1888-1913, Dr. Karl Helfferich gives some interesting information as to the development in the dimensions of business undertakings in Germany. To illustrate the movement he gives the following table which epitomizes the results of the trade censuses of 1882, 1895, and 1907.

Number of Concerns and Persons Employed in them

	1882		1907	
	concerns	persons employed	concerns	persons employed
Small concerns,				
1-5 employees	2,882,768	4,335,822	3,124,198	5,353,576
Medium concerns,				
6-50 employees	112,715	1,391,720	267,410	3,644,415
Large concerns,				
51 and more employees	9,974	1,613,247	32,007	5,350,025
Concerns of 1000 and more employees	127	213,160	506	954,645
Total	3,005,457	7,340,789	3,423,615	14,348,016

Appropos of this movement Dr. Helfferich says, "It appears therefore that of all persons engaged in gainful employments in 1882, 59 percent were employed in small concerns. In 1907, on the other hand, only 37.3 percent fell to the small concerns, 37 percent to the large, and 25.7 percent to the medium concerns. Whereas, therefore, more than two and one-half times as many persons were employed in small concerns in 1882 as there were in large ones, the two classes had almost reached a complete equilibrium by 1907. From 1882 to 1907 the number of persons engaged in small undertakings increased not fully one-fourth, whereas the number in the great concerns increased more than threefold, and those in the very largest concerns four-and-one-half-fold.....The enormous development in the association of labor, which finds expression in the great increase in size of concerns and in the centralized organization of related undertakings, had its prerequisite basis - to a certain extent even its cause - in the growth of capital, and in its mobilisation and concentration. The greater the business undertaking and the more extensive its technical equipment, all the greater must be the capital working in cooperation with its laboring force. Conversely, the greater the amount of capital at hand, and the greater the possibility of concentrating huge amounts of capital for centralised business purposes, all the stronger is the tendency to develop, expand, and consolidate business undertakings in a rational way for the purpose of earning the largest possible profits." ¹

¹Germany's Economic Progress and National Wealth, 1888-1913,
page 39.

3. A study of the failure reports published by Dun and Bradstreet.

The reports put out by the firms of Dun and Bradstreet on the statistics of the business failures in the United States and the causes thereof, present some interesting facts bearing on the subject which we are discussing. From these reports we are able to ascertain two things: first, the number of failures in different groups of concerns, classified as to size; second, the causes of these failures. Although the census reports show that there is a strong tendency for the number of manufacturing concerns to become absolutely less in some cases, and proportionately less as compared with the amount of production in many cases, Bradstreet's report¹ gives as one of the strongest factors contributing to business failures the too rapid increase in the number of trading, manufacturing, and commercial concerns throughout the country. The report states as follows: "In the two decades preceding 1916 the country's population increased 22 percent in each decade, while the number in business gained 30 percent and 27.7 percent respectively." It points out that the dilution, as they call it, of the number in business is clearly shown by the large number of failures which are due to incompetence and inexperience. As a matter of fact these firms are chiefly in the group of the very small producers and traders, those with capitals less than \$5000, who, tho great numerically,

¹Failure statistics - Their Meaning and Utility. 1916. Published by Bradstreet Company.

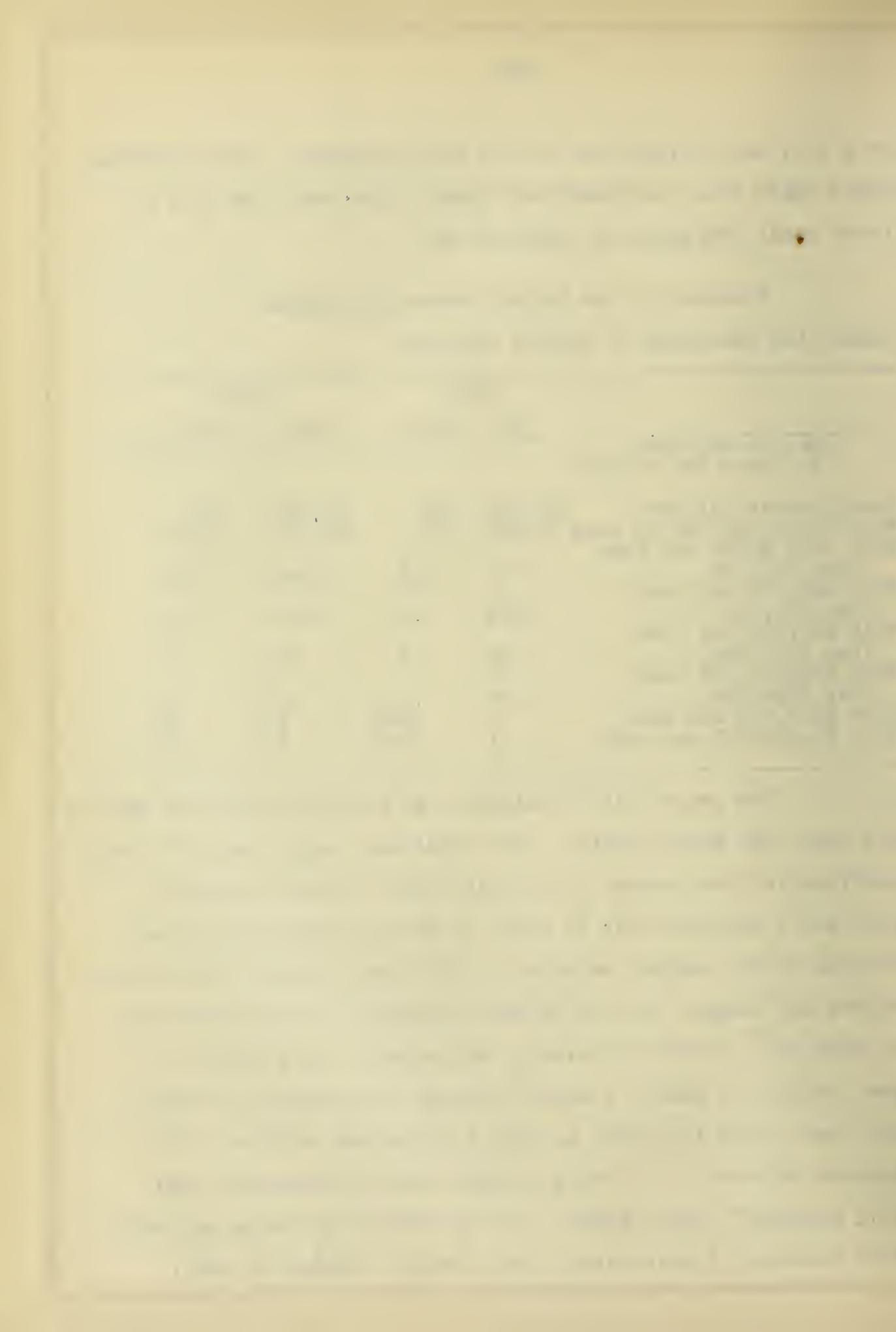
do a very small proportion of the total business. The following table taken from the Bradstreet report shows what the fate of these small companies is likely to be.

Failures in the United States and Canada
Classified according to capital employed

Capital employed by those who failed	1916		1915	
	No.	P.ct.	No.	Pct.
Total number failures	18,268	100	21,661	100
With \$5000 capital or less	17,372	95	20,251	93.5
With over \$5000 and less than \$20,000	712	3.9	1,046	4.8
With \$20,000 and less than \$50,000	126	.7	232	1.1
With \$50,000 and less than \$100,000	33	.2	69	.3
With \$100,000 and less than \$500,000	24	.1	61	.3
With \$500,000 and over	1	.005	2	.01
With \$1,000,000 and over	1	.005	2	.01

The great bulk of failures, 95 percent, are firms employing less than \$5000 capital. The Bradstreet report says, "If any confirmation were needed of the idea that the small trader's path was a dangerous one in 1916, it would be afforded by the returns of the capital employed by those who failed in the United States and Canada. Of the 18,268 failures in the two countries in that year, 17,372, or exactly 95 percent, had a capital of five thousand or less. A search through the records of twenty-six years fails to reveal so high a percentage as this, the nearest approach to it being in 1900 when the proportion was 94.2 percent." Dun's report,¹ in the section on large and small

¹The Record of Insolvencies, Dun's Review, January 6, 1917.



failures, compares large and small failures in the United States for several years. Failures are divided into two groups: those with liabilities less than \$100,000, and those with liabilities more than \$100,000. The following table shows for ten years the two classes of failures for manufacturing and trading concerns.

Large and Small Failures

Year	No.	Manufacturing		Under \$100,000
		\$100,000 or more	Liabilities	
1916	116	\$29,257,548	4080	\$43,742,032
1915	163	58,700,533	4953	53,325,951
1914	216	93,548,237	4404	42,088,042
1913	213	74,134,110	4030	48,988,418
1912	146	41,854,150	3693	44,865,682
1911	181	48,099,935	3321	39,271,688
1910	158	57,557,168	3122	27,359,717
1909	142	35,730,686	2888	28,985,862
1908	159	54,552,551	3668	42,276,464
1907	188	76,049,383	2725	30,591,061

Trading

1916	54	\$14,467,600	11,869	\$76,906,228
1915	111	38,986,288	15,919	111,247,359
1914	136	72,805,493	12,715	93,059,359
1913	101	36,421,367	11,044	78,693,845
1912	77	16,104,893	10,934	75,675,072
1911	84	18,564,720	9,396	65,674,959
1910	65	17,930,662	8,864	57,060,331
1909	63	13,699,089	9,461	55,395,679
1908	77	20,888,237	11,195	70,773,720
1907	65	12,670,161	8,354	46,027,987

It is clear that the strain on the small trader is very heavy. From this consideration of the number of failures of the different classes of concerns as to size, we are led to ask the causes of these business failures. Is it because they are too small to be efficient, is it the inexperience of the management, or what is the cause of this high mortality in the ranks of the small concerns? The reports throw some light on this subject.

In the years from 1890 to 1912 lack of capital stood out as the compelling cause of failures according to Bradstreet. In 1912 incompetence came first as a cause; in 1913 and 1914 lack of capital forged to the front again. Last year, 1916, incompetence took first place once more. The following table, made up from information presented in Bradstreets , gives for 1915 and 1916 the different causes of failure ranked as to the percent of all failures.

Percentages of Number of Failures and Liabilities
in the United States in 1916 and 1915, Classified as to Causes

Failures due to	Number		Liabilities	
	1916	1915	1916	1915
Incompetence	33.2	29.9	21.8	17.3
Inexperience	6.0	5.4	4.4	2.4
Lack of capital	30.3	27.5	31.9	28.4
Unwise credits	1.9	2.4	2.6	3.9
Failures of others	.9	1.0	4.6	9.2
Extravagance	.6	.6	.6	.6
Neglect	2.4	1.9	1.0	1.0
Competition	4.2	5.7	2.5	3.3
Specific conditions	13.4	18.9	19.3	24.7
Speculation	.4	.4	3.9	2.2
Fraud	6.7	6.3	7.4	7.0

Lack of capital and incompetence are the predominant causes of failure. About one third of the failures arise from the fact that companies are unable to command sufficient resources to give them sufficient competitive strength. This, of course, indicates that the small concerns do business at a considerable disadvantage. Incompetence, the other important cause of failure, is also characteristic of the small producer or trader today. It is the larger concerns which can afford to employ managers of experience and ability in their particular line. If the facts

presented by the failure reports of these two companies are reliable and significant of the actual conditions existing today, then one would conclude that the excessive mortality rate for the small concerns indicates that they suffer from a considerable disadvantage as compared with the larger concerns, and that they better their status progressively as they increase in size.

4. Investigations which have been made into the relative efficiency of manufacturing establishments

The government has made some investigation into the costs of a few industries as a part of their work on the trust problem. However, whenever the relative costs of different establishments have been investigated, it has only been as an incidental to the main investigation. Consequently the results presented are incomplete and unsatisfactory for this sort of a study. Indeed, W. C. Redfield, Secretary of Commerce, in a letter to the writer, stated that the government has no reliable and trustworthy information on the subject, notwithstanding its vital importance.

In the Report on the Petroleum Industry¹, it was pointed out that the Standard Oil Company was a very efficient concern, but it was emphatically asserted that the rapid growth of the company had been due not to the efficiency of the plants and the organization, but to the unfair practises which it made use of. Any efficiency which existed was the result rather than a cause of the growth.

The report of 1911 on the Steel Industry² showed that the large company controlling many plants had an advantage over the smaller companies in the matter of costs, but from plant to plant there was great variation in costs. Some of the larger plants were found to have higher costs than the smaller ones.

¹ Commissioner of Corporations, Report on Petroleum Industry, pages 21-23.

² Ibid., Report on Steel Industry, Part III, Chapter 1.

The information is not sufficiently detailed to enable one to compare the plants of different sizes as to costs.

In the report on the International Harvester Company¹ it is shown that the International has an advantage over the independent concerns with respect to the cost of production. For example the average factory costs for binders for the International plants was 58.57, and for the same period for the independent concerns it was 76.18. These are exclusive of the selling expenses. The independent concerns have a lower unit selling cost than the International and in this way make up in some measure for the comparatively high selling costs. It should be noticed that the report uses the management unit rather than the operating unit in speaking of costs. Since we are interested in this study only in the costs of individual establishments, these costs are significant only if it is true that the establishments of the International are larger than those of the independent concerns. As a general thing the Commission found this to be true. While there may be a presumption in favor of the conclusion that since the International is more efficient than the independent concerns and since its operating units are larger, then the large establishments make possible lower costs, we cannot, however, accept this as a proven fact. The International may, through the exercise of power of a monopoly character, be able to purchase its labor and materials at a cheaper rate than can the independent concern.

¹ Commissioner of Corporations, Report on International Harvester Company, pages 1726-30.

This brief review will show how little the government has done in the way of investigating the problem. When we turn to individuals, we find that there has been even less done. The rise of the large combinations as a menace to the public welfare has attracted the attention of many writers on economic problems, but almost without exception the problem has been handled entirely in a theoretical way with no or very few facts to verify the theory, and the majority of writers concerning themselves with large scale management rather than large scale production.

Several writers have attempted to attack the trusts by showing that the profits of the large combinations have been a disappointment to the promoters. As has been pointed out, however, this sort of a study has little significance in connection with the relative efficiency of individual plants.

In the periodical, Industrial Management, formerly called the Engineering Magazine, which is of somewhat technical nature, and whose contributors are men who have had actual experience with industrial problems, we find some attention given to the problem by the different writers. The concensus of opinion among these technical men seems to be that while up to a certain point in the growth of a business enterprise, lower unit costs can be realized, growth beyond this point will result in a reaction which will show itself in rising costs. No attempts are made to determine just where this point of most economic production is. For example, one writer in speaking of steam costs says, "It is a principle of the generation of steam power that proportionate economy increases as the size of the unit increases.

..... It should be observed, however, that when a unit becomes a certain size there is little or no economy consequent on duplicating or multiplying that unit by other factors. That is why when a unit is as large as 1000 Horse Power the economy from increasing the size of the unit by simple multiplication becomes inconsiderable and disappears.¹

The greatest weakness of the large establishment, according to these technical writers lies in the difficulties of effective supervision arising from the weakened responsibility of the managers and the inefficient methods which creep in inevitably where personal supervision is eliminated and red tape substituted for it. One writer says, "A complex system of red tape methods and reports will eventually enmesh a factory in a set of hide-bound methods which are almost impossible of adaption to new and changed conditions."²

Another writer, Hart Vance, in the Engineering News, gives a forceful presentation of the same idea, namely, that the plant may grow so large that it will suffer from want of administrative ability to match the exigencies of management.

Mr. Vance is a well known draftsman in the engineering field. He presents, in the form of actual instances taken from his experience, a strong case against our large industrial establishments. He points out that the errors which he is criticising are central rather than peripheral; that is, they originate in the "heads", not in the "hands" of the organization. From his experience he has been led to believe that the methods of

¹Engineering Magazine, Volume XX, page 612

²W. O. Weffler, Engineering Magazine, Volume XXXII.

management in our large corporations are very defective. In the administration of business many practises which, tho intended to promote efficiency, really turn out to be expenses rather than savings. It is these attempted savings which really results in expenses in the long run which Mr. Vance terms "Pseudo Economies." The following is a typical illustration of what he calls Pseudo Economies. "The company.....uses in its drawing room an ink of varying and always inferior quality in buying which 15 to 20 percent of what the best inks cost is 'saved.' Estimates made during particularly bad spells of this ink indicate that its ultimate cost is from \$100 to \$125 a bottle."

After citing numerous instances where savings of a few dollars are made at the expense of a hundred or more, he goes on to say, "Such blunders, all of which impair the draftsman's efficiency, originate in the short-wittedness of mis-chosen local 'heads'. But they also indicate deficiency somewhere above these heads, and thus suggest a fatal fallibility in the controlling mind of the organization.....No glimmer of the financial genius that (presumably) blazes in the central councils of the great industry seems to reach the outskirts of the immense system. I have repeatedly worked in a drawing room where the temperature ranged between 90 and 105 degrees F., but no intelligent authority saw what an excellent investment might be made in one-half a dozen fans. Yet during the heat the product of the drafting room was reduced 50 percent off normal. The instances here adduced might be reenforced with hundreds of others of like import..... It is not out of order to remind these projectors that a great

industry is a great composition of human efficiencies, and the mastery of such principles is indispensable to their success." Mr. Vance concludes with a plea for higher standards in the business world. "The cardinal truth, which truth they nor their superiors apprehend, is that efficiency of any organization depends on its morale; and that the morale is the resultant of personal forces and ethical relations subject to definite laws and determinable with just as great decision as the stress of a steel structure."¹

In April, 1917, Mr. Earle Buckingham, of the Winchester Repeating Arms Company, to whom I have already referred in the previous section on the Census Reports, read a paper before the American Society of Mechanical Engineers which he devoted to the subject of the effect on costs of the increases in the size of a business enterprise.² In the paper Mr. Buckingham contended that there is a limit to the profitable increase in the size of a business enterprise, and to fortify his contention, he presented material taken from the records of the United States Census for 1910. He ascertained the costs of labor and the cost of materials per 100 dollars worth of sales for different sizes of concerns in different industries. A study of the results shows, he believes, that in general the cost of materials shows a rise as the concern grows larger, while labor costs show a decrease per unit of ^{product} _{as the} concern grows. He says, "If the volume of business be doubled,

¹ Engineering News, October 19, 1911.

² Mr. Buckingham was so kind as to send me a copy of the paper and a letter further elaborating his views.

labor costs decrease by an amount equal to two percent of the total sales.....These figures reveal the surprising fact that in every line of business I have examined, the cost of materials shows an increase disproportionate to the growth of the business.

.....If the census reports are relatively correct, the fact remains that when the amount of business is doubled the purchasing cost increases by an amount equal to one percent of the total sales."

So much for Mr. Buckingham's conclusions which he drew from his study of the census reports. As to the validity of these conclusions, he was careful to point out that the census reports leave much to be desired in the way of completeness and detailed information, and that the conclusions could not be accepted as absolute. In addition to the statement of the tendencies indicated by the census reports he went further and gave opinions of his own, based on his experience as a mechanical engineer. These opinions are very interesting, and are, I believe, worth quoting to an extent that the writer's views be made clear. Mr. Buckingham says, "The factor of personality of those directing the business plays an extremely important part. This factor determines to a great extent, the personnel of the establishment, which in turn is reflected in every department. In fact, I believe that the limit of economic growth of any business depends on the ability of the directing personality to keep in close touch with the details of the work. If the man who controls the policies of a business is intimately acquainted with the details and requirements of its several departments, he will be able to

really value and appreciate the results accomplished. He will also command the respect of all his subordinates. Any real appreciation of good work well done is one of the strongest spurs to increased efficiency that exists. If this factor of personality is the controlling one, it almost automatically limits the economic growth of certain lines of business where the details are so numerous as to be beyond the compass of one mind.....It may, however, be assumed that the sale costs will increase faster than the gross amount of business increases. As a firm's market widens, its efforts are more scattered and an increasing proportion of its advertising, catalogs, and salesmen's visits bring no returns. Thus I am personally acquainted with a comparatively small shop that up to a few years ago was awarded about fifty percent of all the work it figured on; it has now doubled in size, but receives only a trifle over ten percent for which it prepares estimates.....In like manner there can be no question that the cost of credits will increase faster than the growth of a business. A small plant will know its customers personally and no great volume of outstanding accounts will be required, nor could it afford to carry them. But as the concern grows a personal acquaintance with the exact financial standing of all its customers is not possible, even with the aid afforded by such agencies as Dun and Bradstreet. Furthermore, the cost of collecting, the carrying of outstanding accounts, and the loss of accounts undoubtedly increases as the volume of business grows."

In conclusion Mr. Buckingham says, "The large concern offers more opportunities for leaks, and these more than consume

the advantages gained by the increase in size. Such leakages might be due to delegation of management, to lavish buying, to excessive expenditures on sales, to careless crediting. Doubtless all of these factors play some part. Large concerns represent not an economic gain as has often been claimed but an actual loss. Of course we should not jump at this conclusion, nor should we accept it until the most thoro search for the true status of American industry leaves us no alternative but to face the fact that we have been deliberately sacrificing economic advantage in our zeal for large combinations of manufacturing establishments." Altho Mr. Buckingham's conclusions are not based on reliable facts, his paper is very interesting in that it shows the trend of opinion among the actual business men.

5. The growth of large establishments in the retail trade

The attention attracted to the changes in the methods of conducting retail trade, including the growth of the department store and its competitive effect on the dealers who confine themselves to a single line of merchandise, led the Massachusetts Bureau of Labor Statistics in 1899 to investigate retail conditions in Boston in regard to this centralizing movement. To throw some light on the subject, various statistics and definite statements from the retailers in Boston were collected and with the conclusions drawn therefrom, were published in the annual report of the Bureau.¹ So far as I have been able to ascertain, this report represents the only attempt at a thoro investigation of the problem of the relative efficiency and competitive effectiveness of small and large stores.

The distinction which the Bureau made between two classes of what are commonly known as department stores shows the tendencies of development in retailing. The department store proper is distinguished from the store with departments. In the department store proper there are many articles sold under one roof which have no generic ^{relation} to one another. In the store with departments the goods are all of one general class; they are related to each other more or less closely. An example of this latter class is the dry goods store which sells articles, milinery, etc., all of which bear some relation to each other.

¹ Report on Labor Statistics, 1899.

The investigation made it clear that in some lines the department stores were encroaching rapidly on the field of the single-line retailer. This was true especially in such lines as small wares, laces, embroidery, women's clothing, toys, trunks, glass ware, etc. In other lines, such as drugs, boots and shoes, groceries, and furniture the single line stores had the field almost entirely to themselves.

After the study of the growth of the department stores and the stores with departments and a comparison with the growth of the single line stores, the report takes up the variation in the sizes of different kinds of stores over a period of years. The size of the store is judged by the number of people in the city to each store.

The following table gives the average population to each kind of store for the census years and the percent of increase or decrease in 1895 as compared with 1875.

Classification of
stores¹

	1875	1880	1885	1890	1895	Percent of inc. or dec. since 1875
Apothecaries (drugs and medicines)	1,461	1,471	1,555	1,563	1,510	3.35
Boots and shoes	1,809	2,199	2,193	2,076	1,656	- 8.46
Carpets	20,113	21343	16266	22424	19788	- 1.17
China, glass & earthen ware	7,433	9,304	8,873	8,305	11043	48.57
Drygoods	2,023	2,573	2,585	2,398	2,643	30.65
Fancy goods	1,828	2,356	2,730	3,900	4,688	156.46
Furniture	2,295	2,555	2,656	2,970	2,227	40.61
Glassware	13,653	15514	17745	15465	14615	77.05
Groceries	357	383	394	392	360	0.84
Hats, caps, and furs	3,454	4,260	4,593	5,750	6,538	89.29
Jewelry	3,419	3,702	3,308	3,550	3,736	9.27
Kid gloves	48,846	45355	39039	74746	62115	27.16
Kitchen Furnishings	34,193	24189	35490	26381	23663	-30.79
Laces, embroideries, etc.	31,084	32985	24400	56060	33128	6.58
Men's and boy's clothing	2,590	4,123	3,683	3,274	2,940	13.51
Men's furnishing goods	5,999	8,246	6,100	5,215	5,286	-11.89
Millinery	2,178	2,147	2,638	2,893	2,199	0.96
Music	21,370	19097	26026	32034	23663	10.73
Small wares	12,211	22677	16974	28030	38225	213.04
Sporting goods	341,919	72568	43377	48831	33128	-90.1
Stationery	5,605	4,970	5,005	5,901	6,999	24.87
Toys	68,384	51834	78079	56080	82820	21.11
Trunks, bags, etc.	12,664	18142	18590	17249	23663	86.85
Upholstery	11,397	13955	15615	16017	16564	45.34
Women's clothing	17,996	32985	24400	28030	29231	62.43

(-) decrease

A considerable decline in the number of retail stores in proportion to the population is shown in china, glass, and earthen ware, fancy goods, hats, caps and furs, kid gloves, laces and embroidery, music, small ware, stationery, toys, trunks and bags, upholstery goods, and women's clothing. There is little or no change in apothecary stores, boots and shoes, dry goods, furniture, glassware, groceries, jewelry, watches, kitchen furnishings, men and boys' clothing, millinery, and sporting goods.

¹Page 34 of the Report.

The following table gives a recapitulation of the above data taking all the stores combined.

Census years	Population	Number of stores considered	Average population to each store
1875	341,919	2,734	125
1880	362,839	2,571	141
1885	390,393	2,701	145
1890	448,477	3,010	149
1895	496,920	3,499	142

The figures show that the average store is serving a larger and larger group of persons. At the same time the wants of the average person are becoming more varied and more extensive. The conclusions which the Bureau has drawn from these and other figures will be brought out later on.

The statements made by the dealers to the agents of the Bureau are more interesting to us today than the figures which give no indication of the growth of department stores and the growing size of all stores. The forces underlying the tendency toward concentration in large stores are largely the same now as then, and it is very likely that a group of retailers today would express themselves much the same as did these retailers in 1899.

I shall present excerpts from the quotations given by the report. "The consumer has the benefit of a large and varied stock to select from in the department store which the smaller dealer cannot meet. The department stores have an unlimited market in which to select their stock, and by means of their large capital can take advantage of every opportunity to buy goods at the lowest prices. Theoretically there may be objections to the concentration of so much under one head, but practically, the

well organized, well conducted department store is a great public benefit and is therefore likely to continue.

"The department stores can make lower prices, since, beside the facilities which they have in purchasing, they bring expenses of administration to the lowest point. In fact, every such store is a combination of a number of stores, each distinct from the other, but all under one management. By means of this combination, sales are largely increased and expenses reduced.

"From a close contact with customers we find the great majority prefer to buy everything, so far as possible, under one roof. By doing so they buy their goods cheaper, and save a great deal of time and inconvenience.

"By purchasing goods in large quantities and directly from the manufacturers and the producers, both in America and in Europe, the proprietors of department stores are able to make lower prices on merchandise than smaller dealers can afford to make. The principal department stores have a large force of buyers at all times in all the markets of the world, constantly on the lookout for novelties; and the large stock which these stores can afford to carry enables them to show at all times their extensive assortment.

"Their large capital enables them to carry an assortment of goods in each department to suit the wants of all, from the millionaire to the day laborer. Their experienced buyers and quick capital enable them to take advantage of many opportunities not open to the smaller dealers."

These extracts from the statements of the dealers will give an idea of the advantages of a large store, especially the department store, as the dealer sees them. I shall now take up the conclusions of the bureau.

They pointed out that there are changes "amounting to a complete reversal of methods in many lines, affecting each line in ways quite apart from any influence the department store may have had. That is to say, the competitive effect of a thoroly organized store wholly devoted to the sale of groceries may be as severe on stores less perfectly organized or working with less capital, as that of the department store can possibly be..... There is a general tendency to widen the range of articles kept in stock even while the establishment may still retain the distinctive character of a grocery, dry goods, or other store."

It was pointed out that the competition was very severe in all branches of trade. As compared with former times the dealer needed more capital, keener methods, etc. to meet the competition. Experience has shown since the publication of this report that the competition grew even more severe. A great many of the small dealers were forced to go out of business. While the growth of the large stores is not the only cause of the increased competition, it plays a considerable part.

In conclusion, the report stated as follows: "The trend of modern business, quite apart from whatever unfair practises may exist among the unscrupulous, is toward concentration of capital and perfection of organization - the elimination of unnecessary expenses and a corresponding reduction of profit on the

individual article accompanied by an enlargement of profit in the aggregate, which permits a lower price to the consumer. It is substantially the same movement that has taken place and still is going on in the industrial world. On one hand the department store, on the other the factory, exhibit it in its highest form, but the same tendency is shown in every branch of trade, every avenue of industry. Its ultimate result, so far as the consumer is concerned, is a wider supply of commodities at lower prices. No such movement can take place of course without arousing active opposition from those who suffer from it, or who are overcome by it, in the transition from the new to the old order."

Since the publication of results of this investigation, the changes in the methods of production in the retail trade have continued to take place in a striking way. The large mail order houses, if we are to believe the reports, are seriously harassing the small dealers. The department stores continue to grow larger and larger. At the same time they are increasing in number. In regard to the conditions of retailing of the present and the probable lines of future development I have questioned several representative retailers as to various phases of the problem. The answers which I received were in substance practically the same as those included in the Massachusetts report. The large majority believed that there would always be a place for the small neighborhood store or specialty store, but in staple lines the large store located in the central shopping district has an undoubted advantage over the small store. The writers were divided on the question of what constitutes the ideal size of

store from the selling standpoint. Some believed that there was no limit, except the market, to the efficient growth of a store, providing that the men at the head were capable. Whether it will be possible to secure such men of ability was not taken up. These optimists as to the future of large stores put considerable stress on the advantages of the large store, that is, the great buying power, the wide reputation, the liberal credit, and so on.

Another group was more conservative. While believing that the medium size has some advantage over the very small store, they doubt the wisdom of growth beyond some vague ideal which exists in the minds of the several writers. Although admitting that the large size carries with it certain advantages, they contend that there are also disadvantages incident to great size which counterbalance and in time outweigh the advantages. The manager of a drygoods store in Springfield, Illinois, writes: "The expenses in a large store are somewhat smaller than in a small store, but there is not the difference often supposed. If we doubled our business in size, we could not cut our prices much, if any. The large store pays its managers, department, delivery, advertising, etc., almost as much as the profit which the owner of a small store makes for himself. Large stores are taken advantage of in the matter of returns and delivery and are forced to add to their overhead by employing general men to oversee this part of the work. Also the extensive cost and audit systems are expensive. These the smaller concerns do not need."

Altho the evidence presented is not sufficient to warrant the formation of conclusions as to the relative efficiency

of different sizes of retail stores, enough has been given to indicate the development which is taking place today and which is likely to continue for some time at least. The increasing keenness of competition will drive individual retailers to the adoption of more efficient and scientific methods and toward the approximation of the most ideal size of establishment. The day when the son followed the father in an established business and succeeded merely because of the good will of the community has passed. Retailers now compete on the basis of the quality of the service, the quality of the goods, and the selling price. Which ever size of store makes possible the best combination of these, will, in the long run, dominate the market.

6. Expressions of opinion based on the experience of business men

In an endeavor to get first hand information on the subject I have sent questionnaires to the managers of various business concerns, asking for such data as they would be willing to give out. To these questionnaires considerably over one hundred responded. The replies can be divided into three classes. There was a very large group of concerns who had no knowledge of the costs of the business, and who were still in the dark as to the actual effect on the unit costs of the enlargement of the establishment. A second and smaller group of companies stated that while they had no cost records sufficiently detailed to enable them to draw conclusions to be accepted as facts, they had sufficient information from which to show reliable tendencies and formulate tentative conclusions. The very few concerns in the third group possessed or claimed to possess data on the subject, but they were unwilling to give it out.

As would be expected, many different aspects of the subject were treated and many different views were presented. Due to this fact an attempt to summarize the opinions would be rather unsatisfactory. With a view to giving a general idea of how the business men react to questions in regard to this subject which is so vital to their success in the future, I shall present statements taken from various letters which I have received.

Indeed, the material presented adds very little new evidence to the discussion but it is valuable in a practical way in that is

shows the attitude of the actual business men.

The following quotations have been taken from a large number of letters received and they have been selected to the end that they be the most representative.

Packard Motor Company: "The issue is fundamental and deserving of a great deal more study than it has received."

Nash Motors Company: "The opinion of the present management based on past experience is that with proper organization there is no limit to the extent to which a plant can be enlarged without affecting its efficiency."

Studebaker Corporation: "We could not furnish any specific facts as to costs of parts or total units manufactured by the Studebaker Corporation. Our manufacturing department follows the general plan of making the costs of Studebaker cars to the consumers as small as possible and is able to do this thru its facilities for quantity production. This is, in general, the simple explanation of production efficiency."

The Saxon Motor Car Company: "As a general thing as your production increases, and you can sell it, your administrative costs decrease, your overhead decreases and your total cost of manufacturing decreases per unit. It is quite possible that a certain organization could more economically produce 20,000 cars than 30,000 or 40,000 cars. No doubt every organization of men engaged in production of a commodity are limited to a certain economical maximum beyond which the cost of production will advance. It is my firm belief that in the automobile business when a company produces 60,000 to 75,000 cars a year, they will not reduce

costs per unit to any appreciable extent if they manufacture twice this amount."

Curtis Publishing Company: "In the multitude of elements affecting costs entering into the business, each element must be considered by itself in the relation existing between the receipts and expenditures. At certain points the expense per unit decreases as the output increases. At other points this exists only up to a certain point, beyond which the result is reversed. In a great circulation, editorial cost eventually almost reaches the vanishing point. Up to a certain point, additional production decreases average costs due to the wider distribution of overhead expenses. At some further point the element of supervision remains practically unchanged with rapidly increased production. At other points the expense of supervision rapidly increases with increased output, sometimes raising the cost per unit of production."

Ernest Reckitt & Company: "It does not by any means follow that to increase the size of a plant as a whole will necessarily reduce the unit cost of the product manufactured and, in fact, the writer has known a number of instances where it has worked out just the other way."

W. W. Kimball Company: "From our observation and experience, we should say that there is an economic minimum in product below which it is not profitable to go, and a maximum of product beyond which further economies are not apparent, but we have no definite data bearing on the subject."

United States Envelope Company: "On general principles the larger the business the further away from the real management

the employees must by force of circumstances be with all the difficulties incident to a loss of close touch with the human element and without that personal touch ideal conditions cannot prevail. Business can get so large, and in some cases, in some lines of business, has become so large that the man at the head who is supposed to be the real manager knows no more about what is being done than the man in the moon but he is held responsible just the same. There certainly is a point where diminishing returns set in, due to increased cost per unit in management or in organization. In each particular business that must be determined by a knowledge of all the conditions and they are so varied that it is difficult to see just where that point is..... In many lines of business they have determined what they believe is the highest unit of efficiency and instead of letting the business of a plant expand say 25% of 50% beyond that point, they install a new plant laid out to grow to the highest point of efficiency."

The Simmons Hardware Company: "The conditions surrounding the manufacturer so vary and so differ that I believe that each particular factory must be judged solely on its own merits and because of its environment. This much I think is about as near as you can come to a general statement, namely, that there is a point in the efficiency of every manufacturing plant where it reaches its utmost efficiency and economy. Beyond that point, further production is an expense and a liability, and not a gain and an asset. The human equation is one of the great factors in this, probably the greatest, for when any organization gets

beyond the active supervision and control of one man, it loses efficiency and economy of operation in direct proportion which that particular man delegates his authority to others.....There is a general belief that large organizations are much the most efficient and the most economical, but as a matter of fact, this is distinctly not true, save in very especial cases. Every such large organization becomes encumbered with expenses and activities not germane to its original purpose and from which it seems unable to divest itself. While on the other hand, a smaller organization, being more under the control of one personality, sticks to its original purpose and is usually run in a much more economical manner. My own experience in the observation of large manufacturing concerns is that large organizations frequently make goods more cheaply, so far as actual shop cost is concerned, than the smaller concern; however, they most invariably are very much more expensive in selling methods and in their office work of every kind and description."

Eastman Kodak Company: "Among the conditions we consider as tending to lower the cost as the size of the plant increases are: More favorable purchasing of the raw materials, although when a certain limit has been reached further economies would, perhaps, not be possible: in general, a betterment of conditions for the workers which would increase the efficiency of the employees: the reduction in overhead charges per unit due to larger output: the larger output likewise tends to decrease the administrative and selling expense per unit. We do not consider that we have reached the point where the advantages of further

increase in size would cease and where disadvantages would ensue. All our factories are built on a unit basis so that they can be expanded as the need arises for larger production."

Service Motor Truck Company: "The large producer can manufacture motor trucks much more cheaply than the small one. In the first place, the large producer - having a sufficient capital - can outline a definite building schedule for a certain length of time; and then purchase materials in large quantities in accordance with the schedule. This means a saving not only in the cost per unit of parts and materials required, but also a saving due to the fact that having a definite production outlined, there is no danger of his having certain units accumulate and become dead stock on his hands, which is one of the things that makes the most trouble for the small producer. Another saving which the large manufacturer can consummate is to have his various parts, units and materials shipped in carload lots, which will save a considerable amount of freight. Another advantage is that the relatively small consumer does not enjoy the open account terms with the parts builders, the result being that he must pay cash in advance or on delivery for his materials, while the large producer is given about thirty days and is then permitted to discount bills at anywhere from one to five percent. The large producer can use shop methods which would be entirely too expensive for the small producer. He can afford to tie up thousands of dollars in jigs, dies, and fixtures which would mean too high an overhead expense to the small producer, the result being that the net cost per finished unit - to the large

manufacturer - is smaller than to the small manufacturer. Of course, on the other side of the ledger, is to be considered the fact that the larger concern has a relatively larger amount of overhead, due to the fact that there are a great many more records and forms of all kinds to be kept."

From these letters one may draw the following conclusions: First, the leading manufacturers of the United States realize that the day is imminent when the solution of this problem of the proper scale of production will become a determining factor in their success. Second, as yet the solution of this problem, for the most part, is still in the realm of speculation and guess work. While our business men realize the compelling need for such an investigation, as yet they stand in the dark for they lack the requisite knowledge of the costs of production. Altho the manufacturers of today hold no logical brief showing that there is a limit to the profitableness of large scale production, yet from their exterior observances of the success and failures of manufacturing concerns and an empirical knowledge of their general operating policies they are almost united in the belief that there is a limit to the efficient growth of business enterprises. The solution of this problem is the work of the scientific manager of tomorrow. It is entirely probable that within a comparatively short time most of the large manufacturing concerns will have departments devoted to the solution of this problem and other problems of cost which are allied with this major and fundamental question.

7. The efficiency of large scale production as a selling point for the large concerns

There is little doubt but that the public has been more or less systematically educated to believe in the efficiency of large scale production; for if once the public believes that the larger a company grows, the lower can it afford to sell, then there will be less objections raised against the large concerns and fewer troublesome and sometimes embarrassing investigations.

It has become a selling point used by many of our larger concerns to call attention to the fact that since they are so large and have such an enormous yearly output, they are able to make and sell at the same price, or somewhat less, and at the same time, give better quality or service than their smaller competitors. This use of large scale production as an argument for lower cost is not confined to manufacturing enterprises. A large farm in Florida is advertised in the prospectus as being highly profitable due to the fact that by virtue of its size it is able to raise and market oranges at a comparatively low cost. Large retail and wholesale stores often point to their size as one of the explanations of their ability to give so much more for the money than their smaller competitors.

As concrete examples of the use of this argument of the efficiency of large scale production as a selling point, I shall cite the advertisements of two well known concerns, the Armour and Company, and the Willys-Overland Company.

Taking the Armour and Company first, we find a section

of a recently published booklet devoted to an explanation of how Armour and Company can give better quality at a lower price than can their competitors. The section is entitled, "How the Three Thousand Products of Armour Make for Lower Selling Costs." Then there follows this line of argument: "It is frequently asked why Armour and Company manufacture such an extensive line of products. The reason is purely an economic one, both in the manufacturing and in the distributing end of the business, and results in ultimate benefit to the producer and consumer alike. Hundreds of valuable by-product commodities have been added to the Armour list through the utilization of what would be otherwise wholly or partially wasted in the killing and the dressing of animals, and the saving means better prices to the stock raiser on one hand, and lowering the costs of beefsteak to the consumer on the other.....In selling and distribution certain fixed charges remain the same whether much or little business is done. By giving the selling force many things to sell, the same fixed expenses are spread over a larger volume of business, and thus the consumer of canned goods, dairy products or soap is able to buy them cheaper than otherwise. Only through many by-products and extra lines is it possible to maintain the great distributing system and render the efficient service that Armour does. The added products help to bear the burden of the fresh meat distribution."

The Willys-Overland Company presents very graphically the great increase in their yearly production - in 1908, 465 cars; in 1911, 15, 314; in 1912, 26,782; in 1913, 34,497; in 1914, 48,473;

in 1915, 93,724; in 1916, 142,807; in 1917, 200,000.¹ Then comes some selling talk: "Broadly speaking that producer has the lowest cost who has the courage to produce the largest output and the reputation which makes a ready market for that output..... For years Willys-Overland costs have been relatively low. The steadfast Willys-Overland policy has been to increase value in Willys-Overland product by both improved quality and lowered price..... And every car has shared in the savings and economies of our greater production."

Sometime before the publication of the booklet by Armour I made an inquiry of them for the purpose of securing material for this thesis. In answer, they said: "We regret that there is practically nothing at the present time which we could offer you which would be worth consideration. We have done nothing as yet in the line of investigating the relations between the volume of output and the various elements of production and distribution costs."

After the publication of the Overland advertisement I wrote to the management asking if they could give me in a general way the elements of expense which showed a decrease with the increase in output, and the departments of the business where the greatest saving was realized. They replied that they were unable to answer the inquiry in a definite manner. Their model car had changed from year to year, and the prices of materials had fluctuated and as a result it would be very unsatisfactory to compare the costs for different years.

¹Chicago Tribune, April 8, 1917.

to me, is that these firms are capitalizing their size to play on the prevalent belief that large scale production is efficient. The firms themselves do not possess data nearly so conclusive as their statements to the public would lead one to believe. It may be true, of course, that the concerns are able to produce at a lower unit cost than their smaller competitors; but that fact has not been established. From my study of conditions in the industrial world as to the practises in regard to cost finding, I believe that these cases are typical. I doubt whether the majority of concerns who claim low selling costs or high quality as a result of their large scale production do, in reality, have the facts to substantiate their claims.

8. A study of gas and electric companies operating in Massachusetts

The gas and electric companies operating in the state of Massachusetts are required to present to the Gas and Electric Light Commissioners each year detailed balance sheets, manufacturing and profit and loss accounts. In these statements the operating expenses are segregated into expenses at the works, expenses of distribution, expenses of management, taxes, and incidental expenses. The amount of product manufactured is also given. These statements are included in the yearly reports of the Gas and Electric Commissioners. Many of the other states have Public Utility Commissions, but Massachusetts is the only state which requires reports sufficiently complete and detailed to enable one to make comparisons of the costs of the different companies. In making a study of the companies operating in Massachusetts several must be eliminated, due to the fact that they partly manufacture and partly purchase the gas or electricity which they sell to the consumers. In such a case one is at a loss to know in what proportions to distribute the various expenses over the gas or electricity manufactured and that bought from other companies.

It is obvious that the profit of a gas or electric company is not a criterion by which the efficiency of the company may be judged. Competition is not operative in the fixing of the rates to be charged by the company. Comparatively high profits may be due to a high schedule of rates rather than to the

low manufacturing costs. Thus it is that the amount of profits is not indicative of the operating conditions to be found in these companies. When we have the operating expenses and the amount of gas or electricity made during the period, it is a simple matter to find the costs per unit of product. We can then compare the costs in different sizes of plants. In making such comparisons, however, considerable allowance must be made for differences in operating conditions from plant to plant. Some cities are near to the fuel supply, have cheaper labor, etc. than other cities; consequently, low costs in individual companies may be due in some measure to advantages inherent in the location of the plant.

I shall take up gas companies first. There are many companies which make both gas and electricity, but in such cases they are required to keep the accounts of the two separate, and to allocate general expenses applicable to both in a proper manner over the two departments. The figures presented are for the year 1915. An examination of the reports of different companies over a period of years shows that they produce at a steady relative cost per unit. That is, altho there has been an absolute increase in the unit costs in the past, the companies hold approximately the same relation to each in the matter of costs. The company with the lowest cost today is very likely to have had the lowest cost five years ago. Since this is true, it is unnecessary to consider the companies for a period longer than one year.

The following table shows 34 gas companies grouped

into three classes: companies making over 500,000,000 feet of gas in 1915, companies which made between 100,000,000 and 500,000,000 feet of gas in 1915, and those which made less than 100,000,000 feet. The output of the individual companies is given by millions of feet. The works cost, the distribution expenses, the management costs, and the total cost of manufacture are given for each thousand feet of gas made. There are eight companies in each of the first groups and eighteen in the third.

Companies which manufactured over 500,000,000 feet of gas in 1915

	Opr. cts.	Dist. cts.	Mgt. cts.	Total cts.
	Millions per M.	per M.	per M.	per M.
Cambridge	949	\$0.43970	\$0.11495	\$0.05916
Worcester	929	.48744	.09052	.04051
Springfield,	909	.34456	.10046	.08824
Lynn	898	.33567	.13145	.03561
Malden and Melrose	812	.35452	.07511	.07180
Lowell	655	.53038	.11305	.04497
New Bedford	635	.33011	.12985	.05018
Lawrence	528	.50959	.08260	.08484
Average		.41650	.10475	.05941
				.5933

Companies which made between 100,000,000 and 500,000,000 feet of gas in 1915.

Brockton	374	\$0.46744	\$0.16969	\$0.08085	\$0.7599
Charleston	335	.47924	.09637	.05947	.5068
Haverhill	309	.30034	.08834	.12127	.6067
Pittsfield	212	.39897	.10985	.10993	.6926
Salem	206	.43380	.08672	.09214	.7064
Fitchburg	143	.51183	.18311	.14008	.7812
Taunton	166	.56624	.09309	.06312	.6759
North Adams	111	.36811	.07654	.10562	.6092
Average		.44074	.11296	.09653	.6673

Companies which made less than 100,000,000 feet of gas in 1915

Arlington	99	\$0.3816	\$0.0689	\$0.1729	\$0.7001
Beverly	94	.4377	.1609	.1094	.7717
Gloucester	83	.4593	.0653	.1633	.7654
Attleborough	67	.6847	.0888	.1204	.7495
Old Colony	67	.3206	.1696	.0889	.6911
Webster & S. Ridge	53	.5237	.0915	.1944	.7855
Leomeister	44	.5125	.0933	.2258	.9603
Greenfield	42	.5132	.1397	.1566	.8970
New Buryport	40	.7701	.1835	.0964	.9071
N. Attleborough	39	.7709	.0588	.1406	.8587
Ipswich	28	.7284	.2664	.4070	1.3935
Norwood	22	.6284	.0560	.1517	.7804
Woburn	21	.8183	.0960	.1822	1.0010
Milford	21	.7559	.1005	.2686	.9983
Plymouth	18	.6283	.0670	.2175	.8795
Amesbury & Salsbury	18	.7031	.0292	.1754	1.0286
Gardner	17	.5921	.1342	.0723	.9560
Vineyard	1	1.3383	.4556	.2013	2.1633
Average		.6425	.1292	.1691	.9469

It is evident that the large companies of the first group have a slight advantage over the companies of the second group. The small companies in the third group operate at a considerable disadvantage in comparison with the companies of the first two groups. The expenses of management show the greatest decrease in the large companies. The average management cost per unit for them is only \$0.05941 as compared with \$0.09541 and \$0.1792 for the other groups. However, since the management costs are only a small percent of the total costs, too much weight should not be attached to this advantage. It is rather significant that the two largest companies show higher costs than the average for the group. It is quite possible that the higher costs are due in part at least to the fact that they have passed the most economic size. At least they show that they have no advantage incident to their size.

The electric companies will be treated in the same way. The various costs will be stated by kilowatt hours made. The companies are grouped according to the kilowatt hours made in 1915. The three groups are: companies which made over 10,000,000 K.W.Hrs., companies which made 5,000,000 to 10,000,000 K.W.Hrs., companies which made less than 5,000,000 K.W.Hrs. There are nine companies in the first group, six in the second, and thirteen in the third.

Companies which made over 10,000,000 K.W. Hours in 1915

		Opr. Cts. per K.W.Hr.	Dist.Cts. per K.W.	Mgt. Cts. per K.W.	Total cts. per K.W.	
			Hr.	Hr.	Hr.	
	Millions					
Edison, Boston	198	.687	.665	.701	2.417	
Worcester	32	.680	.590	.265	1.913	
United Electric	31	.820	.426	.305	2.108	
Edison.Brocton	16	.852	.525	.469	2.509	
Cambridge	15	.821	.583	.289	2.417	
Fall River	14	.596	.552	.414	2.195	
Lowell	13	.986	.573	.568	3.089	
Lynn	12	.922	1.055	.216	3.156	
Malden	10	<u>1.010</u>	<u>1.139</u>	<u>.668</u>	<u>3.887</u>	
Average		.8193	.6786	.4326	2.6322	

Companies which made 5,000,000 to 10,000,000 K.W. Hours in 1915

New Bedford	7	.890	.840	.441	3.093
Haverhill	7	1.006	.508	.718	3.112
Lawrence	7	1.189	.879	.502	3.765
Salem	6	.903	.476	.767	2.943
Webster	5	.859	.529	.231	2.189
North Adams	5	<u>.938</u>	<u>.204</u>	<u>.476</u>	<u>2.064</u>
Average		.9641	.5726	.5226	2.861

Companies which made less than 5,000,000 K.W. Hours in 1915

Attleborough	3	1.030	.277	.346	2.907
Vineyard	3	3.332	1.183	.383	5.345
Beverly	2	1.437	.526	.391	3.274
North Hampton	2	1.468	.337	.787	2.985
Plymouth	2	1.296	.547	.734	2.817
Quincy	2	1.238	1.745	.790	4.385
Weymouth	2	1.652	.321	.211	2.606
Amesbury	1	1.222	.277	.346	2.907
Gloucester	1	1.710	1.307	.647	4.566
New Buryport	1	1.723	.475	.473	3.330
Citizens	0.7	7.820	1.501	1.683	12.756
Block Plant	0.5	4.298	2.901	2.443	4.687
Buzzards Bay	0.5	<u>3.293</u>	<u>1.901</u>	<u>2.297</u>	<u>5.013</u>
Average		2.424	1.023	.7331	4.421

The results show a somewhat different condition than was found in the gas companies. The unit distribution costs in the large companies are higher than those in the medium and small companies. The other costs decrease as the size of the company increases much in the same way as did the costs in the gas companies. The small companies operate at a great disadvantage as compared with the companies of the other groups.

The Edison Boston is so large that is might well be placed in a class by itself, its output being six times the output of the next largest company. Its costs are higher than those of many of the smaller companies, and the unit management cost is especially high. While the high works and distribution costs may be due to operating conditions, it seems improbable that such conditions would cause such high management costs. It is very probable that in this department, if not all the departments, the increased size has led to increasing costs.

Little comment is needed on the tables presented since they show clearly the relative efficiency of the different companies. Any attempt to make a refined analysis of the results would only be likely to lead to the formation of faulty and untenable conclusions.

9. The relation between the amount of business done and the costs in fire and life insurance companies

The business of insurance is so closely related to the welfare of the people that it has been regulated and supervised by the states for the purpose of insisting on adequate reserves, checking misapplication of funds, and protecting the insurers by requiring a general publicity of accounts. The first state insurance department was established by an act of the Massachusetts legislature in 1855, and since that time an increasing number of departments have issued reports with growing completeness and detail.

Life insurance is of such a nature that it is much more difficult to secure a proper basis for comparing the costs in different life insurance companies than it is in the case of fire insurance companies. The life insurance company writes policies which are for long periods. The amount of new business written is a small percentage of the business already on the books. A growing company will write large amounts of new business, and its expense ratio will be comparatively high if the expenses are compared with the total business in force, since the cost of securing new business is very high as compared with the cost of carrying old business. Another company which writes only as much new business as it has expirations will show a low expense ratio as compared with the other company, altho they may be equally efficient. To properly compare different companies, the expenses of operation should be allocated over the new business written and

the old business in force. The impossibility of properly apportioning the expenses of a life insurance company from the data available makes a comparison of companies very difficult.

The fire insurance company on the other hand more nearly approximates the industrial which turns out its product day by day. The policies run for a period less than a year up to one, two, or three years. A comparison of the amount of business standing on the books at the end of any one year with the amount expiring the following year will show that the expirations will almost approximate the amount standing on the books at the beginning of the period. It is evident that a considerable amount of the insurance written is for less than a two year period. This being the case, there is no necessity for distributing the expenses over the new and old business. Treating either the amount of premiums earned or the premiums received in a year as the income of the year and comparing with it the expenses or cost gives a reliable basis for judging of the efficiency of a company. The state reports give much more definite material on fire than on life insurance companies. Several of the states have required that companies reporting to them shall segregate their underwriting income and expenses and the investment income and expenses; distinction must be made between premiums earned and premiums received. Many expense and loss ratios are presented which are not given for the life insurance companies.

I shall take up the fire insurance companies first on this account.

Fire Insurance Companies

Fire insurance companies have been growing in size at a pretty steady rate of increase. The following table gives by ten year periods from 1870 to 1900 and by each year from 1901 to 1916 the average number of companies, including foreign companies, operating in the United States, the average premiums charged per year and the average premiums charged per company a year.¹

Period	No. of Cos.	Total Fire Premiums Received Expressed in Millions	Average per Company Expressed in Thousands
1915	193	\$519	\$2,690
1914	191	502	2,632
1913	185	474	2,567
1912	183	440	2,409
1911	180	412	2,294
1910	175	393	2,248
1909	163	371	2,280
1908	162	345	2,135
1907	169	351	2,082
1906	156	322	2,064
1905	158	298	1,880
1904	144	283	1,960
1903	147	261	1,777
1902	145	245	1,693
1901	146	218	1,498
1891-1900	140	159	1,140
1881-1891	152	99	651
1871-1881	177	58	332

The growth as shown here is rather striking. In the five year period from 1910 to 1915 the average amount of business per company has increased twenty percent. As will be seen later on, the growth is not level. That is, there is no common size of company which all companies approximate, but a comparatively few

¹Taken from Spectator Year Book, 1916.

companies write a large part of the business. In 1915 three percent of the United States companies reporting in Illinois wrote twenty-five percent of the business written by all the companies reporting.

In 1911 the Committee appointed in New York State to investigate the affairs of fire insurance companies, reported that out of every dollar paid into a fire insurance company on the average $38\frac{1}{2}$ cents is paid out for expense. It gave the following as the normal distribution.

Salaries, rent, and administrative expense	7.5 %
Commissions	21.5 %
Taxes	2.5 %
Special agents, salaries and expenses	3.5 %
Inspection, local boards, etc.	1.5 %
Printing, postage, etc.	<u>2.0 %</u>
Total	38.5 %

This will give an idea as to the nature of the expenditures of an insurance company and the relative importance of each class. It will be well to keep this approximate distribution in mind when considering the most economic size of a company. It is the variation of these expenses with the size of company which we shall study in trying to ascertain the relation between the size of the company and its costs.

It is interesting to examine the current opinions on the subject. A well-known writer on the subject of fire insurance, Mr. Willet, says, "The larger the insurance company is, the cheaper it can afford to give insurance. It might be impracticable, but it would not be economically unjustifiable, to require small companies to carry higher reserves in proportion to the amount insured than the large companies are compelled to carry.

In the absence of conflicting influences each branch of insurance would finally be concentrated into the hands of a single company. Nor is there any reason why the process of centralization should stop here.....The enormous company carrying all the risks would be the ideal organization of insurance."¹

A prominent English writer takes another view of the matter. We are living in an age in which merit is erroneously attached to mere size. The hunger for size is a disease, and many of the amalgamations which we have seen - some of them on terms which must strike the observer as preposterous - are merely symptoms of a disease and not competent management. The theory which lies at the root of the desire for size is almost always falacious. It is urged that the big company can conduct its operations at a less relative cost than the small one, but how often do we see a large company really showing a lower rate of expense than a small one? As a matter of fact, the expense of conducting fire insurance, in spite of the alleged benefits of expansion and amalgamations, shows a constant tendency to rise, and an examination of fire insurance accounts over a considerable period indicates the advance in expense is very large indeed. Since next to the item of fire claims the most important outgo consists of expenses and commissions, the item of expenses needs as careful watching and curtailing as does that of fire claims."²

¹ Economic Theory of Risk and Insurance, Vol.14, Columbia University Studies in History, Economics, and Public Law.

² F. Harcourt Kitchin, principles and Finance of Fire Insurance, pages 237-238.

The diversity of opinion held by these students of insurance problems shows that the treatment of the question has been more theoretical than factual. The first serious attempt to investigate the costs of different companies was made in 1911 by the Joint Committee of the Senate and Assembly of the state of New York appointed to investigate the affairs of insurance companies other than those doing life insurance business. The question of costs was taken up as incidental to the study of the earnings of different companies. As part of their investigations they took six of the largest companies, six of the medium companies, and six of the smallest companies and figured their earning rate for twenty years, or failing that, for the lifetime of the company. All the companies were United States companies. The assets of the companies were used in determining their size. The method used to determine the earning rate of a company was to take the difference between the proprietary interest at the beginning and the end of the year and add the dividends to the stockholders less any possible assessments from the earnings for the year. The ratio of this result to the proprietary interest at the beginning of the year gives the earning rate. In the case of a fire insurance company the proprietary interest is defined as the capital, surplus, and thirty percent of the reserves. This percent of the reserves is based on the fact that an insurance company can usually re-insure its risks for thirty percent of its reserves.

The results for the three groups are:¹

The six largest

1 - 10.9 %
2 - 12.8 %
3 - 10.0 %
4 - 9.3 %
5 - 10.1 %
6 - <u>7.6</u> %

Av. 10.1 %

The six medium

1 - 6.0 %
2 - 8.9 %
3 - 6.9 %
4 - 4.8 %
5 - 9.2 %
6 - <u>4.6</u> %

Av. 6.6 %

The six smallest

1 - 8.0 %
2 - 6.3 %
3 - 5.9 %
4 - 4.8 %
5 - 2.3 %
6 - <u>2.3</u> %

Av. 4.5 %

Six new companies were chosen at random and treated the same way. Of the six, all of which were from five to ten years old, three have lost money. The study led the commission to draw the following conclusion. "These figures seem to demonstrate.... that what money is being made in the insurance business is being made by the old, large, established companies, that the new companies are quite as likely to lose as to make money, and in a general way the prosperity of a company is in pretty close correspondence with its size and standing."

I shall take up first a study of the fire insurance companies included in the insurance report of the state of Illinois for the year 1916. One hundred and thirty-one companies are studied out of the one hundred and thirty nine listed. Eight were omitted on account of the lack of sufficient data. With the exception of a few of the very small companies, all of them do business in the other states, and in speaking of the business of any company the total amount of its business is meant and not merely the amount which it writes in the particular state.

¹ Report of Joint Committee of the State of New York appointed to investigate the affairs of insurance companies other than those doing life insurance business.

The companies are divided into nine groups based on the amount of premiums received during the year 1915.

Less than	\$ 100,000
\$100,000 --	500,000
500,000 --	1,000,000
1,000,000 --	2,500,000
2,500,000 --	5,000,000
5,000,000 --	7,500,000
7,500,000 --	10,000,000
10,000,000 --	15,000,000
15,000,000 and above	

In the Appendix B there are given the figures for the individual companies included. For each company there is given the percent of commissions to premiums received, the percent of salaries to premiums received, and the percent of total expense to the premiums received. An examination of these individual company expense ratios will throw considerable light on the operating conditions of the companies in the different groups. The small companies lead a rather precarious existence. There are very wide variations in the ratios of commissions, salaries, and total expense from one company to another. As we go to the companies in the groups which write larger amounts of insurance, there appears to be normal expense ratio for each group which the companies tend to approximate. A few go above this normal and fewer go below it. An example of a company which has been going below the normal expense ratio for its group is the Globe and Rutgers. It is found in the fifth group. So far as I have been able to learn, the only explanation of its very low expenses and very high dividends as compared with the average company is its efficiency of operation. It does not possess any apparent advantage over any of the other companies which would enable it to

do business at a lower cost.

It may be objected that the data is for only one year and that in calculating the expense ratios the amount of premiums received is used rather than the amount of premiums earned. It is quite true that it would be unfair to judge an individual company from its report for one year. The loss ratio especially fluctuates considerably from year to year. By taking several companies in each group, individual fluctuations are balanced off against each other much the same as the fluctuations of one company are balanced against those of another over a period of years. As for using the premiums received rather than the premiums earned as a basis in figuring ratios, there is a diversity of practise. Illinois, for example, uses the amount of premiums received in finding percentages. Massachusetts, on the other hand, uses the amount of premiums earned. The Spectator year book gives the ratio of expenses to both the premiums received and to the premiums earned. A comparison of the two shows that the ratio of expenses to premiums received is about two less than the ratio of the expenses to the premiums earned. The average ratio of expenses to premiums received is 40.36 for the years from 1909 to 1915. The ratio of expenses to premium earned for the same period is 42.64. The two ratios fluctuate together consistently year by year. Since our study is one of relativity, it makes little difference which one of these we take. The difference in the two ratios is probably due to the rapid growth in the size of the companies. That is, companies as a whole are writing more business each year than they wrote

the year before.

The following table gives a summary of the 131 companies by the groups. The ratio which the amount of insurance written by each group bears to the amount of insurance written by all the groups is included.

Summary of 131 Fire Insurance Companies by classes

	Number of companies	Percentage of total insurance written by each class	Percent of commissions to premiums received	Percent of salaries to premiums received	Percent of total expense to premiums received
Less than \$100,000	19	0.33	35.9	45.34	155.6
\$100,000 to \$500,000	39	3.72	29.79	6.76	49.9
\$500,000 to \$1,000,000	29	8.88	27.99	5.22	41.8
\$1,000,000 to \$2,500,000	17	11.99	27.67	4.02	41.1
\$2,500,000 to \$5,000,000	13	19.15	27.43	4.16	40.6
\$5,000,000 to \$7,500,000	6	15.65	23.41	4.83	37.51
\$7,500,000 to \$10,000,000	4	14.15	24.55	3.57	36.47
\$10,000,000 to \$15,000,000	2	10.76	24.25	2.90	35.4
\$15,000,000 and above	2	15.87	25.1	3.35	37.85

Some explanation may be needed to account for the apparent deviation of the group whose premiums are from \$5,000,000 to \$7,500,000 from the principle running thru the table. It is in this group that the Globe and Rutgers Company comes, whose extraordinarily low expense ratio we have already commented on.

Eliminating it from the group, the percentages would be: percent of commissions to premiums received, 24.85; percent of salaries to premiums, 5.32; percent of total expense to premiums, 39.87. It will be noticed that the commission ratio is rather low and the salary ratio is rather high. It is very likely that this is due to the companies in this group making a slightly different separation of the items of salaries and commissions. The amount for salaries should be reduced and the amount for commissions increased.

While the majority of the companies are in the smaller groups, the most of the insurance is written by the few very large companies. When it is considered that the small companies with their very high expense ratios write only three tenths of one percent of the total insurance, not much importance need be attached to them. Their total expense ratio of over one hundred percent is due to the high ratios of a few companies as can be seen from the appended tables giving the companies individually. The three expense ratios given decrease steadily until we come to the last group of companies whose premiums received are \$15,000,000 or more. It would seem that altho the medium company has a distinct advantage over the small company, this advantage does not continue indefinitely. After a company gets to the point where it is receiving around \$10,000,000 a year in premiums further growth will not bring further economy, and it may bring increased costs as is shown in the largest companies given in the table.

I shall next take up a study of the companies included in the Massachusetts report. It may be noted that with the

exception of the very small state companies, the companies operating in each state are practically the same. A company of any size does business in all the important states. In this study I have combined the companies whose premiums received are less than \$100,000 with those whose premiums are from \$250,000 to \$500,000, making one class of the two. I have also put all the companies whose premiums are \$10,000,000 or above in one group. For the years from 1909 to 1916 I will give the ratio of the underwriting expenses to the premiums earned, and the ratio of the investment expenses to the investment income earned, and the ratio of losses to the amount of insurance in force. Notice that in this case I use the amount of premiums earned rather than the amount of the premiums received as a basis for getting the ratios of expense. Since the study covers a longer period of time than the other, the results will be more reliable.

The following table presents the ratio of losses to the amount of insurance written. As would be expected, there is apparently no principle governing the proportion of losses to the insurance written. The whole matter depends on the care exercised in selecting risks. There is no reason why the small company cannot select risks as judiciously as the larger company. The small companies exhibit a greater variation in the losses from year to year than is shown in the case of the large companies. It is an established principle of insurance that the more risks a company carries and the more scattered they are, the more stable will be its loss ratio.

Percent of losses to Insurance written

Companies classified as to status, 1915	No.	1909	1910	1911	1912	1913	1914	1915	Av.
Less than \$500,000	25	45.19	48.40	52.57	58.86	53.69	60.79	56.76	53.75
\$500,000 to \$1,000,000	25	53.91	54.91	59.39	56.17	56.69	64.52	53.44	57.00
\$1,000,000 to \$2,500,000	12	50.00	53.21	54.18	55.78	55.81	63.35	54.70	55.69
\$2,500,000 to \$5,000,000	13	52.50	54.15	57.59	55.49	54.46	64.97	54.43	56.26
\$5,000,000 to \$7,500,000	6	46.00	53.01	56.57	52.77	55.69	59.48	51.85	53.64
\$7,500,000 to \$10,000,000	3	52.66	50.63	55.49	55.24	56.80	60.07	55.54	55.29
\$10,000,000 and above	4	53.00	53.21	55.34	56.09	57.51	61.10	56.49	56.10

The next table will give the ratio of underwriting expenses to the premiums earned. Attention is called to the fact that a few of the companies included in the table just given are not included here because data on underwriting expenses was not available. The same sort of a variation will be noticed also in the table giving the ratio of investment expenses to the investment returns.

The companies in the group whose premiums earned are from one to two and one-half millions shows an abnormally high expense ratio in comparison with ratios of the other groups. This inconsistency is largely due to the experiences of two companies, the Agricultural and the Newark, who for several years have had very high expenses in comparison with the amount of business done. After making allowance for these unfortunate companies, the ratio becomes consistent with the other ratios.

As did the first study, this more complete investigation shows that there is an advantage in size up to a certain point. After this most economic size is reached, further enlargement is very likely to lead to increased expenses. A company writing business which brings in from five to ten millions of premiums a year approximates the ideal size from the standpoint of underwriting expenses. As the companies approach the ten million mark in premiums, they begin to enter the stage of diminishing returns.

Percent of Underwriting Expenses to Premiums Earned

Companies classi- fied as to status as of 1915	No.	1909	1910	1911	1912	1913	1914	1915	Av.
Less than \$500000	22	44.53	42.43	40.39	42.15	45.55	47.39	45.04	43.92
\$500,000 to									
\$1,000,000	22	42.59	42.16	42.67	41.44	42.77	42.42	42.93	42.28
\$1,000,000 to									
\$2,500,000	11	43.88	44.08	44.88	45.18	43.93	41.69	44.10	43.97
\$2,500,000 to									
\$5,000,000	13	41.61	41.65	41.17	41.09	42.97	43.87	40.85	41.89
\$5,000,000 to									
\$7,500,000	7	37.50	39.81	39.14	38.56	41.39	40.86	40.34	39.65
\$7,500,000 to									
\$10,000,000	4	38.25	37.47	40.81	38.90	38.11	37.60	38.01	38.45
\$10,000,000 and above	4	<u>37.25</u>	<u>48.62</u>	<u>37.31</u>	<u>37.94</u>	<u>40.13</u>	<u>39.09</u>	<u>41</u>	<u>38.78</u>
Average		40.80	40.89	40.91	39.75	40.69	41.84	41.77	

A study of the investment expense ratios does not show a governing principle so clearly. A considerable variation can be observed in each group from year to year. Especially is this true in the case of the larger companies where we find a variation of over ten percent. It is worthy of comment that since 1909 the investment expense ratio has been steadily decreasing, which would indicate that the companies are becoming more effective in their

investment department at least. I believe that from a study of these results one could say that in its investment department the medium company is at no disadvantage as compared with the large company. There is some indication that the larger companies are actually less effective. A company reaches the most economic size in the investment side of the business sooner than it reaches the most economic size in the underwriting side of the business. The third group of companies operate at a considerable disadvantage in underwriting, but in the case of investments it has the second lowest ratio and is only three tenths of a percent under the most effective group.

Percent of Investment Expenses to Investment Returns

Companies classi-
fied as to
status, 1915

	No.	1909	1910	1911	1912	1913	1914	1915	Av
Less than \$500000	26	10.4	8.67	8.66	9.37	8.97	12.0	9.78	9.69
\$500,000 to									
\$1,000,000	25	10.8	7.63	8.87	9.03	8.03	9.81	8.03	8.74
\$1,000,000 to									
\$2,500,000	12.	7.2	6.50	7.90	6.16	8.13	5.69	4.81	6.63
\$2,500,000 to									
\$5,000,000	13	6.38	7.71	7.44	7.45	7.86	8.04	7.10	7.44
\$5,000,000 to									
\$7,500,000	6	8.8	6.61	10.60	6.33	4.55	3.87	3.50	6.31
\$7,500,000 to									
\$10,000,000	3	9.0	8.62	8.90	9.32	9.51	8.15	8.54	8.85
\$10,000,000 and above	4	15.0	13.01	12.66	11.07	13.51	6.82	4.63	11.08
Average		9.65	8.39	9.29	8.50	8.36	7.77	6.64	

While the rate of dividends is not a safe criterion by which to judge the efficiency of a company, in a general way it shows at least whether the company is making enough to declare dividends, and if it is, it gives some idea as to the amount

declared. I have chosen at random representative companies of each of the following groups: companies whose premiums received are more than \$5,000,000; companies whose premiums received are from \$1,000,000 to \$5,000,000; companies whose premiums received are less than \$1,000,000. For each company there is given the average dividend declared over a period of ten years, 1906 to 1916. There is also given the net book value per one hundred dollars of the stock of the individual companies. It should be remembered that the amount of capital stock a company has is of very little significance; it is scarcely anything more than a basis of stating the ownership.

Companies whose premiums received are more than \$5,000,000 a year

Company	Av. Rate of Dividend	Book Value of Stock
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Aetna	17.7	\$251.68
Home	38.5	308.20
Hartford	34.5	455.21
Insurance Co. of N.A.	12.0	234.83
St. Paul F. & M.	13.6	451.65
German American	30.0	633.61
Firemen's Fund	11.4	277.65
Continental	21.9	255.87
Globe and Rutgers	37.1	1,340.07
Queen	<u>23.5</u>	<u>553.75</u>

Average	23.9	476.32
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Companies whose premiums received are from \$1,000,000 to \$5,000,000

Agricultural	14.3	468.27
Camden	11.1	217.83
Concordia	8.6	166.66
Newark	12.4	185.94
Security	10.1	173.27
Germania	17.2	415.10
Boston	23.3	354.95
Niagra	11.6	185.94
Westchester	34.0	482.95
New Hampshire	<u>10.0</u>	<u>259.41</u>

Average	14.9	291.03
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Companies whose premiums received are less than \$1,000,000 a year

Company	Av. Rate of Dividend	Book Value of Stock
National Brewers	8.3	\$166.78
German, Peoria	4.9	137.77
Albany	9.9	323.93
Hamilton	3.0	166.13
Mechanics	10.0	277.69
Potomac	1.5	217.00
Imperial	7.5	216.91
Old Colony	3.0	208.09
Humbolt	14.8	175.61
Standard	<u>7.6</u>	<u>354.60</u>
Average	8.8	224.45

(Above tables made up from data given by Spectator Year Book, 1916)

The principal reason that the amount of dividends declared may be a misleading criterion by which to judge a company is the fact that dividends may be paid out of a surplus accumulated in the past, or earnings which could be paid out as dividends are sent to surplus. By combining the amount declared as dividends in a given year with the increase or decrease in surplus, we have a criterion which should give reliable indication of the efficiency of a company. Where in the earlier study we considered the amount which the companies paid out in its relation to the income, now we consider how much the companies are able to save out of the income. It is looking at the companies from the side of profits rather than expenses.

I have chosen representative companies in the different groups of companies classified as to size, and for a period of five years have combined the underwriting income with the investment income and the dividends declared during the period with the additions or deductions to or from the surplus. The latter

will give substantially the amount saved from the operations of the business. A comparison of the two results will give the ratio of the amount saved to the total income of the company. It should be stated that the income is the income earned rather than the income collected. The figures are found in the Spectator Year Book.

Companies whose premiums received are above \$10,000,000 a year

Company	Ratio
Aetna	8.41
Insurance Co. of N.A.	8.11
Hartford	4.83
Home	<u>11.04</u>
Average	8.09

Companies whose premiums received are from \$5,000,000 to \$10,000,000 a year

Company	Ratio
Fidelity Phoenix	13.76
Globe and Rutgers	15.77
Queen	9.37
Continental	20.41
St. Paul F. & M.	<u>7.94</u>
Average	13.45

Companies whose premiums received are from \$1,000,000 to \$5,000,000 a year

Company	Ratio
Connecticut	6.19
Niagara	10.94
Westchester	6.20
American	11.33
Camden	6.65
Concordia	6.80
Glen Falls	<u>5.72</u>
Average	7.69

It is evident at once that the large companies have been declaring dividends at the expense of the surplus. That is, while they have been paying much higher dividends than the medium sized companies, their actual earnings have been at a lower rate. This is of course on the assumption that the companies of all sizes

are capitalized much alike. If for instance, the larger companies have grown without enlarging their capital accordingly, they would likely be under-capitalized, and consequently would show a high rate of dividends in comparison with the company which had a normal or even excessive capitalisation. The actual figures show that none of the four companies in the first group have made any large additions to their surplus in the past five years and that the Aetna and Hartford have in two of the five years paid dividends out of surplus, and the other two have in one year paid their dividends partly out of surplus. It would seem that the large dividends of the large companies are a sign of an unhealthy condition. Altho they are maintaining a rate of dividends which they have declared for many years, they can no longer do it with the ease they once did. So long as they continue with a diminishing surplus or a surplus which is increasing less rapidly than does the volume of business, the company is living on its fatness accumulated in the past years when its business was more profitable.

The other figures seem to further illustrate what was shown in the study of the expense ratios - that the companies from five to ten million are the most efficient. They have the lowest expense ratios and the fact is evidenced by the amount which they are able to save out of the total income earned each year.

It may be well to summarize the points which I believe the data presented establishes:

1. The small companies operate at a considerable dis-

advantage in all the departments as compared with the larger companies.

2. The medium companies are somewhat at a disadvantage in their underwriting, but in their investments they appear to be at no disadvantage.

3. The largest companies have passed the point of the most economic size and are entering the stage of diminishing returns.

4. No group of companies exhibits any particular advantage over any other in the amount of losses as compared with the amount of insurance in force.

Life Insurance Companies

As I have stated before, the business of life insurance is of such a nature that from the data available it is not possible to make such comparisons between the companies of different sizes as would enable us to draw any trustworthy conclusions as to the costs in the different groups of companies. Altho there has been considerable theoretical discussion on the subject, except in a very general way nothing has been done toward making an actual investigation of the costs of the life insurance companies.

There has been an exceptional growth in the size of life insurance companies in the past few decades. To give some idea of the movement toward concentration I have made up the following table from figures given by the Spectator yearbook for 1915. The companies included are those reporting to the state of New York. For every fifth year from 1875 to 1915 there is presented the number of companies, the number of policies written by them, the amount of policies in force, the average amount per policy.

Year	No.	Policies expressed in thousands	Amount of Policies Millions	Av. per Company expressed in thousands	Average policy
1915	35	8,284	\$15,609	\$445,992	\$1884
1910	33	6,049	11,669	353,627	1929
1905	43	5,306	10,553	245,438	1989
1900	40	3,021	6,947	173,677	2206
1895	34	1,877	4,818	141,710	2566
1890	31	1,276	3,547	114,420	2783
1885	29	814	2,023	69,776	2484
1880	30	608	1,475	49,199	2425
1875	45	274	1,922	62,712	2481

Since 1900 there has been an absolute decrease in the number of companies operating in the state of New York. In the same period the amount of insurance written per company has

more than doubled. The growth is further brought out by the fact that the average policy is becoming smaller and smaller as insurance is becoming popularized. The man with the little means is taking out insurance as well as the man who is well to do, altho on a smaller scale. It requires as much if not more effort and outlay to write a policy of one thousand dollars as it does to write a policy of five thousand dollars. The company must increase its force faster than it increases its business since a larger proportionate outlay is required per hundred thousand dollars worth of business than was required fifteen or more years ago.

A few of the very large companies have written most of the business. The laws of the different states have been so rigorous that it was very hard to organize and to get a new company started.¹ Those which were already established and especially those which had the advantage of an early start had almost a monopoly. In some cases the states have gone so far as to give the large companies an advantage in the competition with the smaller companies. Under these conditions we find that in the early nineties three or four companies were writing considerably over one-half the total business. The following ^{table} shows the ratios which the assets and the insurance in force of the four companies the Equitable of New York, The Mutual, the Metropolitan, and the New York Life, bear to the total assets and the total insurance in force of all the companies in the United States.

¹The Investments of Life Insurance Companies, L. W. Zartman, page 250.

Year	Number of companies	Ratio of assets of 4 companies to assets of all companies	Ratio of business of 4 companies to business of all companies
1915	235	44.88	38.09
1910	211	51.02	44.83
1915	110	56.27	53.14
1900	Not given	58.90	56.23
1895	" "	58.20	60.20

Up until about 1890 the percentage had been rising.

The years from 1893 to 1895 mark a turning point, and from then on to the present the percent has been declining rapidly. The decrease has taken place not only in these four largest companies, but in all of the ten or fifteen largest companies.

All this shows that the large companies are not maintaining their position; the smaller companies are absorbing more and more of the business. If the large companies were more efficient than the small ones, they would continue to grow and one would expect that even the weakest of the larger companies would decline in favor of the one or two largest companies. It seems likely that the large companies have grown unwieldy of their own proportions, and that they have reached their natural limit in growth.

The amount of business done by the large companies is almost beyond the conception of the layman. For the year 1915 the assets, the total income, and the insurance in force for the New York Life and the Mutual were:

Company	Assets	Total Income	Insurance in force
New York Life	\$822,917,850	\$131,111,430	\$2,403,800,878
Mutual Life	616,528,254	87,862,968	1,636,538,117

For that year the two companies had 22.01 percent of the total business done by all companies, and the New York Life

alone had 13.09 percent of the total business.

This exceptional growth of companies has attracted the attention of students of insurance. Burton Hendrick in his book, *The Story of Life Insurance*, published in 1907, has a chapter which he calls "The Race for Bigness." In this he says, "The overshadowing evil has been the craze for size. In the last thirty years the Mutual, the Equitable, and the New York Life have concentrated their energies on a single end. They have aimed at leadership, not in providing the safest and the lowest cost life insurance, but in writing the largest annual new business. They have aimed at quantity, not quality. They have become the most conspicuous illustration of the American passion for bigness..... The high cost is explained by the outrageous payments to agents, in the shape of commissions, bonuses, prizes, and miscellaneous forms of entertainment, by reckless advertising, rebates and advances; by the solicitation of business in foreign countries at the expense of the American members..... The big New York companies have more than a half a million each (lives), an excess which, merely from the groundwork of mortality average, adds nothing to their strength. They could split themselves into twenty or thirty smaller companies, each as strong and as solvent as the parent concern. The other rational reason for an increased size is a logical decrease in the management expenses. Obviously the more policy holders contribute to the cost of running a company, the smaller should be each one's share of the fixed charges. As long as an increasing business decreases expense it is an excellent thing. Quite the contrary has happened however.

The New York companies' increasing business has resulted in increased expenditure."

The writer goes on to point out that the officers have made the increasing business an excuse for demanding enormous salaries. Great administrative machines have been built up. All these things go together to raise expenses. The wasteful methods used by the large companies in their endeavor to enlarge have extended in their effects to the smaller companies. The large companies by giving prizes, high commissions, etc. have set a standard which the small companies must follow if they get business. To maintain their footing many of the companies have been compelled to make outlays disproportionate to their abilities. Thus the cost of insurance has been raised whether buyers patronize the small or the larger company.

The great money power possessed by the large companies has caused legislators to view with some apprehension their unrestricted growth. Demands have frequently been made that some limitation of the business companies be allowed to write be set up in order to protect the people from the dangerous power which is incidental to great masses of capital under one control.

As a result of the agitation for some protective measure a joint committee of the senate and the assembly of the State of New York was appointed to investigate the affairs of life insurance companies. As a part of the recommendations they made as a result of their investigation, they advised that a limit be set on the amount of business written by the large companies.

They recommended that the following limitations should apply to the different companies grouped according to the amount of total insurance in force.¹

Total insurance less than \$50,000,000, no limit.

\$50,000,000 to \$100,000,000, 30 percent thereof.

\$100,000,000 to \$300,000,000, 25 percent thereof.

\$300,000,000 to \$600,000,000, 20 percent thereof.

\$600,000,000 to \$1,000,000,000, 15 percent thereof.

If the total insurance in force shall exceed \$1,000,000,000, the new business shall not exceed \$150,000,000 annually.

In discussing the grounds for setting up such limitations, the commission said, "The business of the Mutual, the Equitable, and the New York Life has grown beyond reasonable limits. Notwithstanding the fact that they have long since passed the point where further enlargement can benefit policy holders, they have resorted to every effort to obtain new business, regardless of the expense which is reflected in diminishing dividends..... Much has been due to pride of growth and zeal for impressive totals, while the huge accumulations of companies and the great responsibilities involved in their management have furnished pretexts for increased salaries and extravagant administration..... No useful purpose will be served by their becoming larger. Their membership is so large and their resources so vast as to make the question of responsible control and conservative management one of extreme difficulty..... The suggested limitation would

¹Report of the Joint Committee of the Senate and Assembly of the State of N.Y. appointed to investigate the affairs of Life Insurance companies, page 388.

suffice to maintain a requisite vitality and a suitable agency organization. There would no longer be an excuse for extravagant commissions and unprofitable foreign branches would be discontinued. With economical administration and under the restraint of wholesome publicity, the three companies would thus be placed on a strong and conservative basis."

The recommendations of the committee were embodied in a law passed in 1907. If the tendency for the smaller companies to absorb the business of the large companies continues as it has for the past two decades, it is likely that the law will not be needed. The working out of the economic laws are accomplishing the result aimed at by the statute.

Recently an interesting development has taken place in the way of an attempt to consolidate several of the small life insurance companies. In 1916 the Consolidated Investment Company, of which Mr. L. D. Wood is president, sent out letters captioned, A Fertile Field, to seventy-seven young companies who were struggling to maintain themselves against the strong competition of the large companies. The letter comments on the great growth in the number of companies after the New York investigation in 1905 which revealed enormous profits, salaries, and large assets. Since that time more than two hundred companies have been organized in the hopes of making large profits. The actual experience of these companies has been very disappointing. Many of them have failed; those which are still operating are existing on or just below the margin. To quote from the letter: "More than a third of these young companies have passed out of existence,

and a great many of the others are fast approaching insolvency. If further losses are to be avoided and the remaining assets preserved, radical changes must be made in their present plans of organization, and in their corporate entities. In view of their heavy losses, the natural conclusion would be that they have engaged in a very precarious and unstable business, in which the elements of risk and hazard could not be definitely determined in advance. That such is not the case is clearly demonstrated by a glance at the gain and loss accounts of our older and larger companies.....The advent of so many new companies into the field brought intense competition for the services of the successful solicitors. The older companies by reason of their prestige, gained thru years of successful operation and accumulation of enormous assets, enjoyed an advantage over their younger rivals."

The letter goes on to dwell further on the causes of the increased costs of the small companies. The main point is that the small companies are suffering from poor management, difficulty in securing new business on a paying basis, and from the fact that the risks are ^{too} _A few to maintain a fair average of mortality. "The upshot of the matter is that while the small companies cannot hope to continue as individuals, if combined into one large company under one management, the yearly losses would be changed into gains. The insurance written would soon reimburse its owners for the losses already sustained and change the character of the investment to one of increasing and constant profit." "The Consolidated Investment Company has been organized for the purpose of acting as the legal medium necessary for the

consolidation of these companies and as a source thru which the benefits gained therefrom may be properly administered and distributed."

This attempted consolidation goes to show that the very small company operates at a considerable disadvantage much the same as does the small company in the fire insurance business. Most of the states require that the companies shall write a certain minimum of insurance for the sake of safety to the insurers. It is generally said that a company cannot feel safe with less than \$10,000,000 of insurance of which not more than \$5000 is carried on any one risk. We are not concerned here so much with this question as we are with the question of the comparative expenses in the different sizes of companies.

My study of life insurance companies has shown that the small companies operate at a disadvantage; the largest companies are rapidly losing their lead due to the competition of the smaller companies and investigators claim that they are actually much less efficient than smaller companies. It is evident that the most economic size of company is to be found in the group of medium companies. In a letter to the writer, Mr. Lawrence M. Cathles, Actuary of the Southwestern Insurance Company of Texas, gives a conclusion based on his personal experience which corresponds very closely to what my study leads one to believe. He says, "When a company reaches a certain size, its operations are too vast for the immediate supervision of the master minds in its organization, and whenever that point is reached, the efficiency of its management begins to decrease. The department heads which

are than employed will probably be less able men than the chief officers of the smaller companies."

10. Summary

The careful reader will have been impressed by the magnitude of the problem to which this thesis is devoted. To solve this problem absolutely would require the employment of a large force of men for a great length of time in investigating conditions in the many factories and productive plants throughout the country. However, the beginnings have been made. Already, the leaders of thought in practical economics, the progressive business men, are devoting no little time and study to this problem as it affects their own enterprises. In this thesis I have, first, presented the theory on this subject. In the second place, I have tried, with the material which is available, to determine whether this theory is consistent with the actual business conditions. In conclusion, I shall summarize the major points which I have shown.

- I. There has been a remarkable increase in the size of business enterprises in the last few decades.
- II. Growing out of this increase in the size of business enterprises, there is an urgent and practical need for investigation of the relation between the size of the business enterprise and its cost of production.
- III. The inadequacy of data on the subject and the reluctance of producers to give to private investigators what information bearing on the problem they do possess make any investigation

very difficult.

IV. The continual reiteration of the assumption that there is no limit to the profitableness of large scale production has caused the assumption to be accepted as truth by the general public. Even though this general belief does exist there has never been any conclusive evidence offered in its support.

V. Such material as I have been able to study indicates that there is a limit to the profitable increase in the size of a business enterprise. There is little doubt that the smallest concerns are at a disadvantage as compared with the medium sized concern but the advantages of size do not accrue indefinitely with the growth of the production unit. At some point there is a most economic size of enterprise which is able to produce and sell at the lowest unit cost. The factors limiting the growth of enterprises seem to be inherent in man himself. There is a lack of ability to organize and administer the mammoth enterprise with the same attention to detail and maintain the same closely knit organization as is possible in the smaller concerns. As a business enterprise grows it reaches a point where the majority of economies due to size are realized. Growth beyond this point means an economic loss

because the advantages of large scale production decrease and are cumulatively outweighed by the disadvantages.

APPENDIX A

Industries in which the number of establishments has remained the same or decreased in 1914 as compared with 1899

Agricultural implements	Lamps and reflectors
Ammunition	Lead, bar, pipe, and sheet
Artificial flowers	Leather, tanned, curried, finished
Bags, paper	Liqours, distilled
Baking powder and yeast	Liqours, malt
Baskets, rattan, willow, wood	Liqours, vinous
Belting and hose, rubber	Malt
Billiard tables and material	Matches
Boot and shoes cut stock (exclusive of factory)	Motorcycles, bicycles
Boots and Shoes	Musical instruments, organs
Boxes, cigar	Needles, pins, hooks and eyes
Brick, tile, pottery, etc.	Nets and seines
Brooms	Oakum
Brushes	Oil, linseed
Butter	Oil, not elsewhere specified
Carpets and rugs	Oilcloth and Linoleum
Carpets, rag	Oleomargarin
Cars, electric, railway	Paper, and woodpulp
Cheese	Photographic Materials
Clothing, men's	Pipes, tobacco
Clothing, men's buttonholes	Pocketbooks
Coke	Pumps, not including power pumps
Collars and cuffs, men's	Rice, cleaning and polishing
Cooperage	Roofing materials
Cordage	Rules, ivory and wood
Cork, cutting	Salt
Crucibles	Scales and balances
Cuttlery and edge tools	Sewing machine cases
Engraving, wood	Sewing machines and attachments
Tiles	Smelting and refining, copper
Firearms	Smelting and refining, lead
Fireworks	Smelting and refining, zinc
Furnishing goods, men's	Soap
Glass	Springs, steel, car, and carriage
Gloves and mittens, leather	Sugar refining
Glucose and starch	Stereotyping and electroplating
Glue	Sulphuric, nitric, and mixed acids
Gold and silver, leaf and foil	Suspenders, garters, etc
Graphite, ground and refined	Tinfoil
Hardware, saddlery	Tin plate and terne plate
Hones and whitstones	Tinware, not elsewhere specified
Iron and steel, blast furnaces	Tobacco, chewing and smoking
Iron and steel works and rolling mills	Tobacco, cigars and cigarettes
Ivory, shell, and bone work	Turpentine and rosin
Japaning	

Upholstering materials
Wall paper, not made in paper mills
Wall plaster
Washing machines and clothes wringers
Wire work
Wood distillation
Wood, turned and carved
Wool pulling
Wool scouring
Woolen and worsted goods

2. Industries in which the increase in output has been disproportionate to the increase in the number of establishments

Artists materials	Confedctionary
Automobiles, parts and bodies	Cordials and flavoring syrups
Automoblies	Corsets
Bags, other than paper	Cotton goods
Belting, leather	Cotton small wares
Blacking, stains and dressing	Dairymen, poultrymen, etc., supplies
Bluing	Dental goods
Bone, carbon and lamp black	Drug grinding
Book binding and blank book making	Dyeing and finishing textiles
Boot and shoe findings (exclusive of factory)	Dye stuffs and extracts
Boots and shoes, rubber	Electric machinery
Boxes, fancy and paper	Emery wheels
Boxes, wooden packing	Engravers' materials
Brass, bronze, and copper products	Envelopes
Bread and bakery products	Engraving, steel and copper
Canning and preserving, fish	Explosives
Carriages and sleds, children's	Fancy articles
Cars and general shop consts., electric railway	Felt goods
Cash registers and calculating machines	Fertilizers
Cement	Fire extinguishers, chemical
Chemicals	Flavoring extracts
China decorating	Flour mill and grist mill prods.
Chocolate and cocoa products	Food preparations
Cleansing and polishing preparations	Fuel, manufactured
Clocks	Furniture
Cloth, sponging and refinishing	Furs, dressed
Clothing, horse	Galvanizing
Clothing, women's	Gas, illuminating and heating
Coffee and spices	Gas, machines and meters
Coffins	Glass, cutting and staining
Comb and hair pins	Gold and silver, reducing and refining
Condensed milk and milk products	Grease and tallow, exclusive of lubricating
	Hair work
	Hammocks

Hand stamps	Saws
Hardware	Screws, machine
Hat and cap material	Screens, wood
Horse shoes	Shirts
Hosiery and knit goods	Show cases
Ink, printing	Silver smithing and silver ware
Ink, writing	Slaughtering and meat packing
Instruments, prof. and scientific	Smelting refining, not from ore
Iron and steel bolts, etc.	Sporting and athletic goods
exclusive of rolling mills	Stamped and enameled ware
Iron and steel forgings, exclusive	Stationary goods
of rolling mills	Steam fittings, etc.
Iron and steel, doors and shutters	Steam packings
Iron and steel wrought pipe	Stencils and brands
Jewelry and instruments	Stoves, gas and oil
Jute goods	Structural iron work
Labels and tags	Sugar, beet
Lasts	Surgical appliances
Leather goods, not elsewhere	Tools
specified	Toys and games
Linen goods	Trunks and valices
Lithographing	Typewriters and supplies
Lubricating grease	Varnishes
Lumber and lumber products	Vault, lights and ventilators
Lumber planing mill products	Vinegar and cider
Matts and matting from fiber and	Watch and clock materials
grass	Watches
Minerals and earths, ground	Wheel barrows
Oil, cotton seed and cake	Wire
Oilcloth, enameled	Wood preserving
Paints	Wooden goods not elsewhere
Paper goods, not elsewhere specified	specified
Paper patterns	
Patent medicines	
Pencils, lead	
Pens, fountain and stylographic	
Pens, steel	
Photographs and graphophones	
Photo-engraving	
Pickles, preserves, and sauces	
Plumbers' supplies	
Printing and publishing, books	
and job	
Printing and publishing, music	
Printing and publishing, periodicals	
and newspapers	
Printing materials	
Pulp goods	
Refrigerators	
Regalia and society badges	
Rubber goods	
Safes and vaults	
Sand and emory paper	
Sausage, exclusive of slaughter-	
ing houses	

3. Industries in which the output and the number of establishments have increased at approximately the same ratio

Artificial limbs	Petroleum, refining
Awnings, tents, soils	Photographic apparatus
Babbit, metal and soldering	Plate ware
Belting and hose, woven	Ship building, iron and steel
Butter, reworking	Signs and advertising matter
Buttons	Silk goods
Canning and preserving fruits and vegetables	Soda water apparatus
Canning and preserving oysters	Statuary and art goods
Card cutting and designing	Stoves, hot air furnaces
Card board, exclusive of paper mills	Umbrellas and canes
Cars and general const., electric railway cars	Watch cases
Cars, steam railway	Window shades and fixtures
Copper, tin and sheet iron	
Druggists preparations	
Electroplating	
Engraving and die sinking	
Flags and banners	
Foundry and machine shop products	
Foundry and machine shop supplies	
Fur goods	
Gas and electric fixtures	
Hair cloth	
Hats and caps, other than felt, straw, and wool	
Hats, fur-felt	
Hats, straw	
House furnishing goods	
Ice manufactured	
Iron and steel, cast iron pipe	
Jewelry	
Lime	
Looking glass and picture frames	
Marble and stone work	
Mattresses and spring beds	
Millinery and lace goods	
Mineral and soda waters	
Mirrors	
Musical instruments not specified	
Musical instruments, pianos	
Musical instruments, piano, organ material	
Oil, essential	
Optical goods	
Paving material	
Peanuts, grading, roasting, etc.	
Perfumery and cosmetics	

4. Decadent industries and industries not comparable because of methods of presenting in the Census Report

Aeroplanes
Aluminum ware
Artificial products
Asbestos materials
Bills
Candles
Carriage and wagon materials
Carriages and wagons
Charcoal
Ice cream
Enameling
Feathers and plumes
Flax and hemp, dressed
Grind stones
Hats, wool-felt
Iron and steel, nails etc.,
 exclusive of steel works
Lapidary work
Lard, exclusive of slaughtering houses
Locomotives, not made by railway companies
Pens, gold
Poultry killing and dressing
Saddlery and harness
 Ship building, wooden
Sugar cane
Theatrical scenery
Type founding
Whips
Wood carpet
Wool shoddy
All others (residuary class of census)

APPENDIX B

Expense Ratios of Insurance Companies Grouped as to Size

The companies whose premiums received are less than \$100,000 a year

Name of Company	Percent of commissions to premiums	Percent of salaries to premiums	Percent of total expense to premiums
Anglo-American	-----	6.6	186.0
Associated Industries	-----	83.3	140.0
Commercial National	25.0	----	26.2
Marquette National	36.4	103.6	301.1
Merchants National	30.3	22.1	80.0
Metropolitan	27.3	4.9	38.5
National Brewers	21.4	12.0	71.9
Buckeye, Ohio	20.9	16.0	54.3
Columbian, Ind.	37.4	14.7	75.3
Dixie	124.0	184.2	446.0
Independent	31.6	0.11	36.7
International, N.Y.	74.4	68.8	171.4
New Jersey	39.0	58.0	711.0
Occidental	47.1	49.0	172.1
Rocky Mountains	26.2	13.2	50.2
Safeguard	13.2	37.2	76.0
Sterling, Ind.	10.1	58.4	163.8
Union, Penn.	27.4	10.0	45.4
United Firemen	18.6	28.9	104.0
Average for 19 Companies	35.9	45.34	155.6

Companies whose premiums received are from \$100,000 to \$500,000
a year

Name of Company	Percent of commissions to premiums	Percent of salaries to premiums	Percent of total expense to premiums
Federal Union	27.6	5.3	39.6
German, Peoria	47.0	9.0	176.0
Albany	26.3	5.7	42.2
American Druggists	15.6	10.7	31.7
American Eagle	25.2	2.3	34.5
Assurance Company	26.2	4.3	35.6
Birmingham, Penn.	35.4	5.0	48.1
Citizens	33.2	----	33.9
California	23.0	9.8	53.7
Cleveland National	35.4	16.6	84.9
Colonial Assurance	36.5	1.3	41.2
Commerce, N.Y.	24.8	7.4	42.3
County of Philadelphia	120.4	10.6	165.1
Eagle	29.8	4.6	44.6
Equitable Fire & Marine	12.3	1.0	40.3
Eureka Fire & Marine	29.0	12.7	52.9
Georgia Home	25.4	7.5	45.8
German, W. Virginia	31.0	9.4	52.7
German, Penn.	30.5	6.0	----
Hamilton	13.8	4.4	22.1
Imperial	25.6	5.4	41.2
Industrial	21.4	2.2	26.6
Nickerbocker	23.8	1.9	26.4
Liverpool, London & Globe	15.9	3.9	32.8
Lumberman's	29.6	7.7	48.3
Maryland Motor	31.3	10.0	56.7
Mechanics	29.3	5.6	50.0
Merchants	29.0	5.8	41.9
Minneapolis F. & M.	20.4	6.1	36.3
National Lumber	33.5	1.9	39.7
Pittsburgh	30.7	4.8	47.0
Potomac	32.0	9.8	50.2
Richmond	31.8	1.6	37.0
Security, Iowa	30.0	6.3	49.4
Security, Ohio	28.8	13.2	53.1
Teutonia, Ohio	22.8	15.8	51.6
Union, N.Y.	31.3	3.7	36.4
Vulcan	13.8	10.0	36.8
Western Ohio	31.2	7.8	49.4
Average for 39 Cos.	29.8	6.8	49.9

Companies whose premiums received are from \$500,000 to \$1,000,000
a year

Name of Company	Percent of commissions to premiums	Percent of salaries to premiums	Percent of total expense to premiums
Allemania	29.0	5.9	46.2
Automobile	22.0	1.7	38.8
Buffalo	28.5	6.0	45.4
City of New York	27.0	7.8	44.3
Commercial	23.5	4.5	38.4
Detroit F. & M.	26.2	6.7	42.6
Dubuque F. & M.	30.0	4.2	43.0
First National	27.9	6.4	48.2
Franklin	----	5.0	47.4
German, Penn.	38.5	6.0	----
German Alliance	25.4	5.7	31.0
Girard F. & M.	29.1	8.3	48.1
Granite State	23.6	4.5	37.6
Humbolt	31.4	5.4	45.4
Massachusetts F. & M.	27.8	5.6	40.0
Mechanics & Travellers	37.8	8.7	43.9
Merchants of America	27.4	3.9	39.4
Merchants Fire Ass'n Cor.	18.4	7.5	31.7
Michigan Commercial	29.1	3.3	45.8
Michigan F. & M.	28.8	3.6	45.2
New Brunswick	31.3	5.3	45.7
Northern	25.3	1.0	41.8
Old Colony	24.2	2.6	33.2
Pacific	26.5	2.8	36.6
People's National	31.5	4.0	46.0
Reliance	26.7	8.1	46.5
Twin City	24.4	5.4	40.4
Virginia F. & M.	24.8	3.9	30.9
Standard	29.2	4.5	43.0
<hr/>			
<u>Average for 29 Companies</u>		27.9	5.2
			41.8

Companies whose premiums received are from \$2,500,000 to \$5,000,000 a year

Name of Company	Percent of commissions to premiums	Percent of salaries to premiums	Percent of total expense to premiums
Connecticut	26.7	6.1	43.6
Fire Ass'n Philadelphia	26.6	4.5	40.7
Germania	27.3	4.6	40.3
New Hampshire	29.0	3.0	39.9
Niagara	23.9	6.5	42.5
Northwestern National	33.4	3.8	44.8
Providence	24.2	2.9	35.3
Westchester	27.1	3.4	39.8
Williamsburg City	36.7	1.1	45.2
American	26.2	5.0	40.0
Boston	21.6	5.0	34.8
Fireman's	27.0	5.0	42.0
Pennsylvania	27.0	2.4	37.4
<u>Average for 13 Companies</u>		4.16	40.6

Companies whose premiums received are from \$1,000,000 to \$2,500,000 a year.

Agricultural, N.Y.	27.9	3.4	41.4
Alliance	23.9	2.3	33.7
American Central	28.2	3.0	41.1
Camden	28.6	4.4	40.2
Commonwealth	23.6	4.5	38.5
Concordia	30.4	4.3	45.5
National Ben Franklin	33.5	4.2	46.0
Newark	26.2	5.9	42.3
North River	28.4	6.4	30.1
Northwestern F. & M.	33.4	3.8	44.8
Orient	24.3	4.8	40.3
Stuyvesant	31.6	1.3	38.1
Glen Falls	27.3	8.7	41.3
Hanover	26.7	3.6	39.2
Milwaukee Mechanics	28.9	4.9	46.9
National Union	22.1	6.2	40.6
Security	25.4	4.9	40.9
<u>Average for 17 Companies</u>		4.0	41.1

Companies whose premiums received are from \$5,000,000 to \$7,500,000 a year

Name of Company	Percent of commissions to premiums	Percent of salaries to premiums	Percent of total expense to premiums
Fidelity Phoenix	24.2	6.1	41.2
Globe & Rutgers	16.2	3.4	25.7
National Commercial	27.7	2.8	40.1
Phoenix	25.7	4.3	40.6
Queen	21.9	6.6	37.6
Springfield F. & M.	24.8	5.8	39.9
<u>Average for 6 Companies</u>	<u>23.4</u>	<u>4.8</u>	<u>37.5</u>

Companies whose premiums received are from \$7,500,000 to \$10,000,000 a year

Continental	23.5	5.5	39.4
Firemen's Fund	23.3	3.1	33.6
German American, N.Y.	25.8	4.0	40.5
St. Paul Fire and Marine	25.6	1.7	32.4
<u>Average for 4 Companies</u>	<u>24.5</u>	<u>3.6</u>	<u>36.5</u>

Companies whose premiums received are from \$10,000,000 to \$15,000,000 a year

Aetna	23.3	3.8	35.1
Insurance Co. of N.A.	25.2	2.0	35.7
<u>Average for 2 Companies</u>	<u>24.3</u>	<u>2.9</u>	<u>35.4</u>

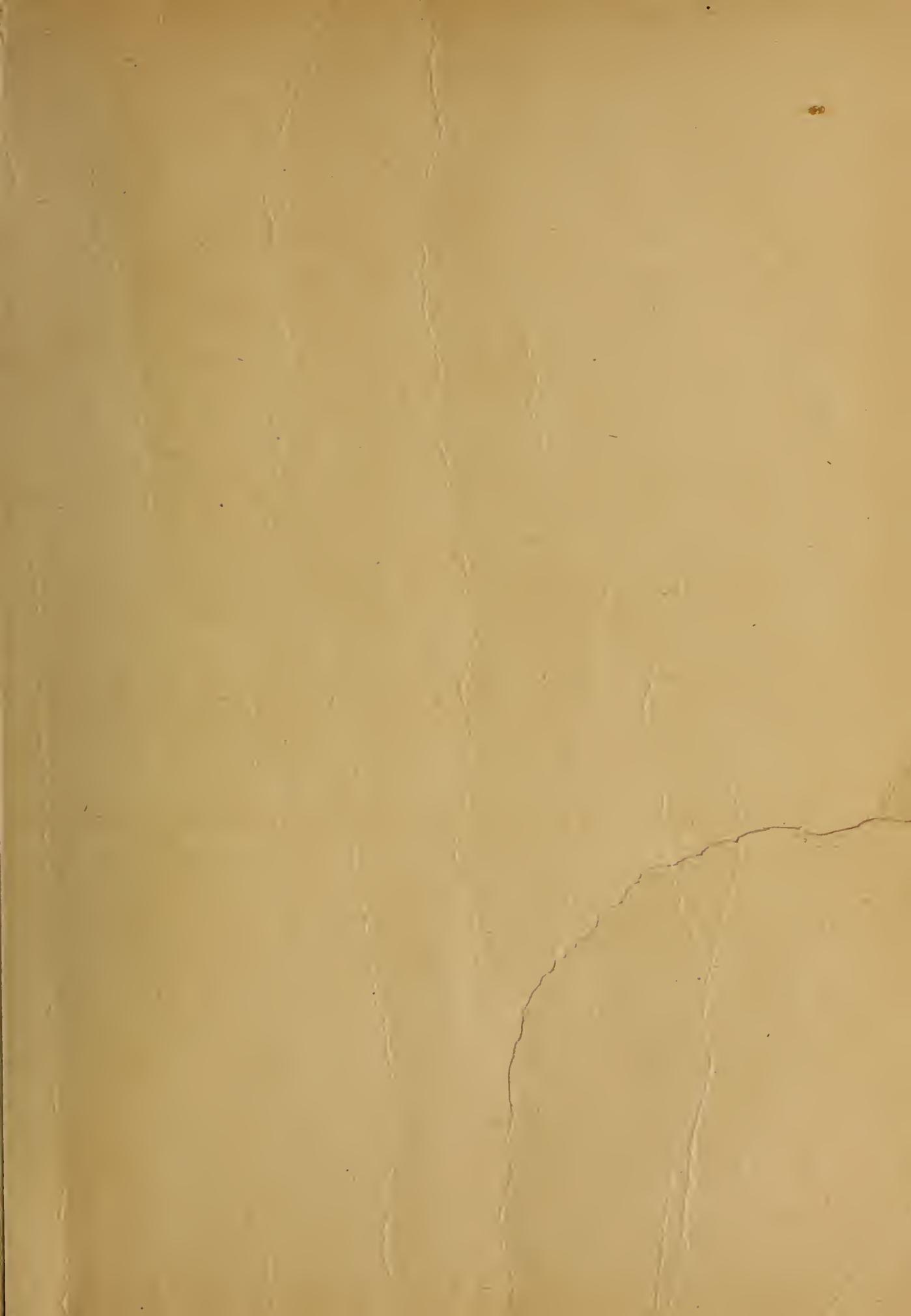
Companies whose premiums received are \$15,000,000 and above a year

Hartford	26.1	3.6	39.2
Home	24.1	3.1	36.5
<u>Average for 2 Companies</u>	<u>25.1</u>	<u>3.4</u>	<u>37.9</u>

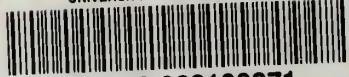
Bibliographical Note

Attention has been called to the fact that there has been very little advance made in the treatment of the subject of this thesis in the last fifty years. Owing to the difficulties of securing data on which to base conclusions, writers have been content to rewrite and revise the existing theory without furthering an understanding of the forces which tend to determine the most economic size of a business enterprise. Economists have recognized the problem as being fundamental, and have usually included a treatment of it in their books on general economic theory. Writers on industrial organization, business management, and allied subjects frequently give some attention to large and small scale production. The business men, realizing the lack of available data, have considered the problem as being academic rather than practical, since they see that the theoretical treatment is based on unestablished assumptions. A few investigations have been made which incidentally touch on the problem, but the results are not sufficiently complete to be valuable. So far as I have been able to learn, no investigation has been made of this specific subject.

Since the treatment accorded this subject by all writers is practically the same, and since this treatment is familiar to every reader of economics, I have not thought it necessary to include a bibliography of the available material on the subject, except that included in the footnotes.



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